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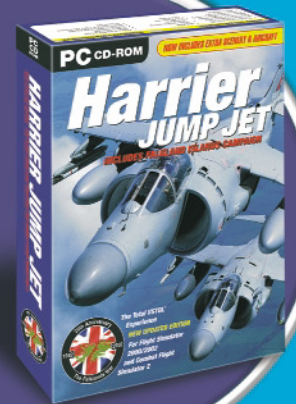
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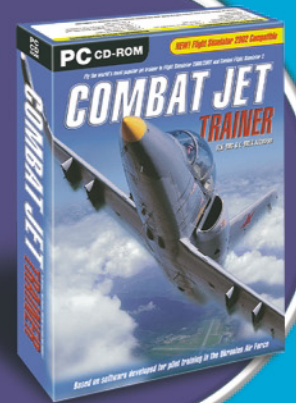
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publish under the same name.

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Editor's letter

X marks the box

Spring has sprung, and now is the time that a young flight simmer's fancy turns to thoughts of... Christmas? Well, not exactly Christmas, but it looks like there'll be plenty of interest to write about as the festive season approaches. Microsoft has announced that Combat Flight Simulator 3 will be out later this year (or, put another way, "in time for Christmas") and Ubi Soft are promising Lock On for autumn, which translates as "in the shops for Christmas". Meanwhile, back in the current section of the space time continuum, where six weeks means 42 days, not three months, we've been working like navvies on a whole variety of articles that we hope you'll enjoy. A wide choice for everyone is the name of the game!

Once you get outside the pages of PC Pilot and on to the High Street, however, there's a chance that the choices for those of us who use our PCs for more than just writing spreadsheets are going to become severely limited. The perpetrator of this crime couldn't have come from a more unlikely quarter – Microsoft! Yes, like it or lump it, we think that the new Xbox console is going to adversely affect flight simulation, certainly in the medium to long term.

We've long said in PC Pilot that Microsoft is unlikely to slaughter the huge golden-egg-laying goose that is FS and CFS by taking it to a console format, but it's a worry that the share of the games market Xbox manages to grab could well be at the expense of PC software, rather than other consoles. Many good commercial developers have renounced the PC format to design for Xbox and, with the news (as we went to press) that the Japanese launch was somewhat lukewarm, it may well end up as an obsolete platform that's dragging much needed resources away from the PC games market. Remember – flight simulation is a part of that market, despite how often we tell people it's not a game.

The net result of an Xbox failure could be that Microsoft licks its wounds and continues to provide us with Windows ZX, FS2004 and CFS4 ad infinitum. However, don't expect to see many products of the calibre of IL-2, Train Simulator or Falcon at your local software shop in the future; the huge markets that the development costs of these products demand will have gone elsewhere. This will relieve Microsoft of the need to push the envelope that bit further when they bring out a new PC title, and it will be to the detriment of flight simmers in



Cutting edge or cutting throats?

the long run. Retailers have already cleared their shelves of PC-compatible games (including flight sims) to make room for the Xbox launch and, if it's a roaring success, you can rest assured that they won't be keen to replace the Xbox products with 'outdated' PC stock. Alternatively, if it's a flop, expect to see the shelf space taken up by a flurry of new releases from the other console producers, who are currently keeping their powder dry while they wait and see how Mr. Gates' Playstation gets on.

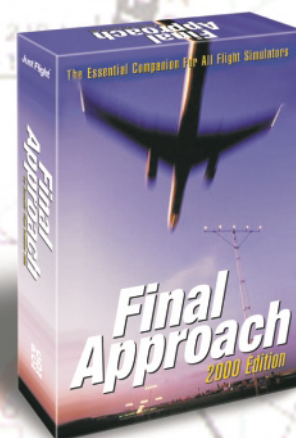
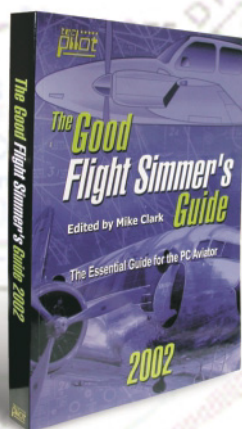
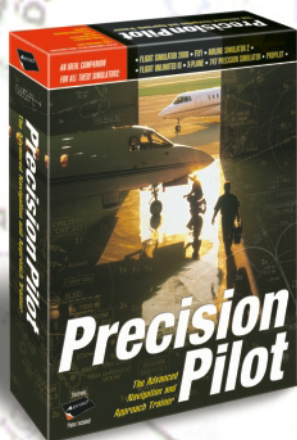
After that note of doom and gloom you'll be pleased to learn that there's some good news. A slowdown of the PC games market might mean that smaller, niche market publishers turn their attention to the loyal and lucrative flight sim community (that's us, folks) and we could actually see more low-volume software publishing that wouldn't normally tempt a commercial organisation. The choice might well go up! Good luck to Aerosoft, Abacus, Lago, Nomisoft, Wilco, Just Flight, X-Plane, Flight One, Xicat, Aerowinx et al – they could well find themselves much bigger fish in a somewhat smaller pond.

Finally, if all the hype over Xbox has passed you by, but you fancy trying out this style of leisure product, here are some simple tips for converting your current PC to a console. Firstly, remove the 2.2GHz processor and swap it for a PII 266 or 300MHz. Then, take out at least half the RAM and downgrade your graphics card to last year's model. Once you've done that, lower your screen resolution to 640 X 480 (256 colours) and chuck away the keyboard. Now, sit back and enjoy the cutting edge of console play. You may wonder what all the fuss is about, but please be patient and persevere with the experience. After all, this is the future and no one said it would be easy!

Dermot Stapleton
Managing Editor

PC Pilot Reader Offer

Save £30.00 on this fantastic training package



We know that many of you closely follow our tutorials and articles on advanced flying, and we've had lots of mail asking if there are any specific programs or books that teach a bit more than the basics. You need look no further! Here's a trio of useful study aids to help you fly to the top of the class.

Precision Pilot is a well established, standalone tutoring program that has been designed to help pilots get more out of their instrument flights. Versions of this software are used by organisations such as British Aerospace and The Royal Flight. This specially

adapted version is ideally suited to all flight sim pilots and normally retails for £34.99.

A powerful, Windows-based approach chart atlas and designer, Final Approach can be used in conjunction with FS2000, Fly!, PS1 or any other realistic general-aviation simulator. As well as over 4,300 charts there's also an excellent tutorial to help you get to grips with understanding charts. Part of the FS Classics range, Final Approach usually costs £9.99.

The final part of your 'study pack' is The Good Flight Simmer's Guide; there's

something here for both expert and novice, and its 246 pages are packed with useful information. Go to your local software emporium and you'll pay £14.99 for this weighty tome.

You'd normally pay almost £60.00 for this great collection of classroom classics. However, order all three in our special Reader Offer and they can be yours for only £30.00, including UK postage. That's essential learning for any flight simmer at almost half price! The offer is only available while stocks last, so don't waste a second!

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Phone: 0870 900 0422 (calls charged at normal national rate).

Please call us between 9am-5pm (UK time) Monday – Friday and one of our operators will be pleased to take your order. Make sure you have your payment details to hand and, if you're calling from overseas, please remember the time difference and dial +44 870 900 0422.

Fax: 01480 357186 (calls charged at normal national rate)

If you are paying by credit card, you can fill in this form (or a photocopy of it) and fax it to the above number.

Post: Return this form (or a photocopy) together with your remittance (if you're sending a cheque) to:

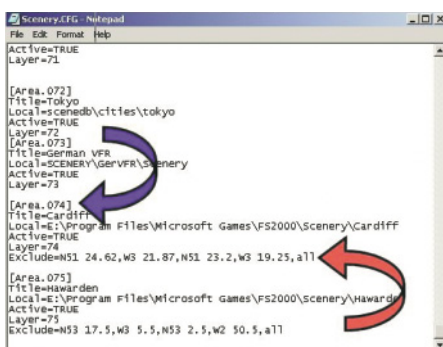
PC Pilot, PO Box 11, St. Ives, PE27 3GW, United Kingdom

Down on downloads

FROM: Maurice Dolphin

I see that you have taken the time to try and inform us how to download and install FS freeware. Having now purchased my fourth copy of PC Pilot I have yet to find how to use anything off any of your CD-ROMs attached to the magazines, never mind downloading any add-ons! I do not understand how to get it from the CD onto my computer without fearing that I may corrupt my system or getting lost within the maze of obscure instructions than come with the programs.

When will yourselves and people who are good enough to supply freeware understand that many of us are not, and never will be, into delving into the depths of computers. We want to click an icon and install. We would rather purchase a commercial product that will install itself than mess about creating folders and directories. This is not an unreasonable request because people like



Gary Summons with his excellent UK scenery can create software that only needs a click to install itself, and many like me are more than willing to pay for the simplicity. If the programmers have the ability to create excellent add-ons, surely they can follow Gary Summons' example and make it install itself, and I am sure those of us who are not computer geeks would be willing to pay for it.

We reply:

The inclusion of the article 'How to Become an Install Wizard' was intended to provide a straightforward guide to the installation of downloads. We included it because many readers have requested such an article, and many have indeed written to tell us that they found it useful (without, presumably, finding out that they have suddenly turned into 'computer geeks'), and we're sorry to hear that it didn't help you at all.

It's worth remembering that our downloads are freeware, created by talented individuals who have kindly allowed us to include their work on our cover CDs. They are not making anything from their efforts – they are simply enthusiasts who are keen to share their work with the rest of us, and the standard of their work is often exceptional and deserves to be seen.

Commercial programs should indeed install with a few simple clicks; you say that you

and many others are happy to pay for such simplicity and that is to a large extent exactly what you are paying for when buying a commercial product. The 'messing about' with creating files, directories etc. is part and parcel of why freeware is free.

Fine chaps such as Gary Summons produce their excellent products as a commercial venture, whereas freeware developers don't. Many of them could well provide full installation programs, but then they might as well put their products in a box, charge for them, and give up their day jobs! (Many of the boxed products you pay for will have started their life as excellent freeware, before a manufacturer picks them up, removes minor bugs, provides a one-click installation and a manual – if you're lucky – and puts them on sale.)

Many people are indeed happy to pay for this ease of use, but on the other hand many, particularly youngsters and those without a large disposable income, are keen to install some beautifully made planes and scenery for absolutely nothing except a little of their time. We review many commercial programs, but downloads are to many an integral part of their hobby. Many of them think that the time invested in delving into their computers is more than worth it for access to literally hundreds of available aircraft, scenery programs, and FS utilities.

All of us at PC Pilot are huge freeware fans, but what do the rest of you think? Too much trouble, or an absolute bargain that might just require a bit of tinkering? Let us know...

FROM: Clive Hand

I wonder if you can help me. I have just tried completing the FMC tutorial in issue 15, using 767 Pilot in Command. I have managed to follow it right up until pressing the [APP] button; the aircraft turns onto the ILS approach but does not follow the glideslope, and I end up flying over the runway at 2,500 feet. Am I missing something or doing something wrong?

Stephen Heyworth replies:

I strongly suspect that you are intercepting the ILS localiser too close to the runway

and/or pressing the [APP] button too late.

The important point is that the localiser must be intercepted first, and then the glideslope. The glideslope must be intercepted from below, i.e. starting with the glideslope needle at the top of the ILS indicator. The [APP] button must be pressed early enough, which means after the localiser is established but also well before the glideslope indicator gets near the central position. If the glideslope needle has passed the central position and is in the bottom half (i.e. you are above the glideslope) it will not capture the glideslope.

FROM: Barry Hester

Are you going to issue a CD of Issues 10/11/12 and if so, when? Whilst I note that back issue 11 is available, obviously I prefer not to buy this if a combination CD 10/11/12 is forthcoming.

We reply:

We're working on the latest back issue compilation at the moment, and should have a release date for it in the next issue, if not sooner. Keep an eye on www.pcpilot.net in the meantime.

FROM: Paul Major

An excellent magazine! Can you recommend a good helicopter simulation, not any arcade-style shoot-em-ups?

We reply:

We wish we could. Going beyond the regular FS helicopters, Search and Rescue 3 is really the only chopper sim on it's way that doesn't have a trigger in the cockpit. We suspect that the notoriously difficult flight modelling of helicopters might be one of the reasons why we're still waiting for the definitive helicopter sim. There must be something in development...

No thanks!

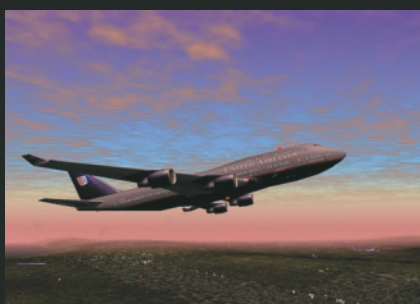


I have been taking PC Pilot since its first issue, and in your third issue in February 2000 I wrote to request help. As a result of that letter I received some 36 e-mails, including one from Australia! Some offered advice, others moral support, and three offered hands-on instruction. I contacted a reader who lives near me who has, with his knowledge and instruction, added a new dimension to my life! He has been very patient with me as, unlike your correspondent Mr Nigel Sanderson, I am not

Good to hear from you, Eric. We're sure that you have plenty of years of flight simming left in you, and we look forward to having you as our first centenarian reader!

I just thought I would show you these screen shots of my 737 cockpit with 11 monitors on 6 PCs. The horizon now stays perfectly level and the views look much more realistic when flying. It all has to do with the angle of the monitor and the zoom setting. So many people have said, "What, no overhead panel?!", so I put in a 4th PCI card for the overhead instead of having the GPS on a client. The Aura Interactor on the chair has been likened to a parachute by friends who come to fly on the weekends! (There are a few more pictures at <http://httpd.chello.nl/~s.ferris.>)

The e-mail itself was announcing the release of the new X-Plane beta, which had obviously kept Austin away from his bed. How many other developers out there would forego their beauty sleep to keep you all happy?



Thanks, Microsoft!

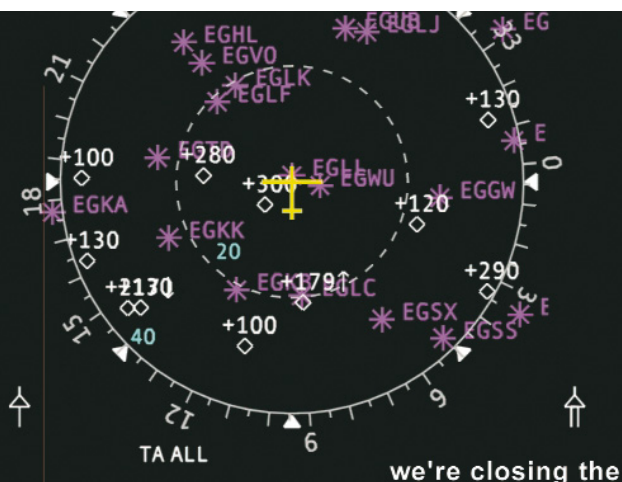
I thought I would tell you of an experience I had last October. I had just become interested in flight simulation and, after a little disappointment from FS2000 (slow frame rates), I decided that perhaps the real thing was for me. So, armed with a gift voucher, I went for my first experience in a light aircraft (a Piper Warrior). Approximately 15 minutes into this flight the pilot fell unconscious and, to cut a long story short, after a short but interesting conversation with Warton ATC, two guys came up alongside me from RAF Woodvale and talked me

down. The reason I tell you this story is in defence of flight simulation. After all the bad press last year, I can honestly say that a few hours with FS2000 saved my (and my instructor's) life, and the insurance company several thousand pounds.

We're glad to hear that you're still with us, Rob. The debate rages on about whether flight simulation is any help in real-world aviation, but in an airborne emergency we'd rather have a flight simmer at the controls than a bus driver.



Thanks for sending us the pictures, and reminding us that there's always a good use to be found for spare monitors.



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NEWS CFS3 LAUNCH ANNOUNCED

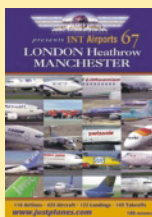
Inside information

FS2002 users will be glad to hear of Microsoft's new Flight Simulator Insider website at <http://zone.msn.com/flightsim>. The site looks set to be a valuable resource for the many fans of Microsoft's latest sim, and will no doubt be first out of the blocks with all things FS2002-related.

Technically minded enthusiasts will be pleased to hear that the first SDKs (Software Development Kits) for FS2002 are now available. The ATC Voicepack, Aircraft Container System, and Traffic Database Builder Utility SDKs can be downloaded from the website.

Just Planes

Just Planes have added several more titles to their growing catalogue, including a 3-hour DVD featuring London Heathrow and Manchester, and a look at Boeing's 777-200 with United Airlines. See www.justplanes.com for the full catalogue.



IL-2 website

Anyone looking for extra IL-2 skins and repaints should take a look at http://spazioweb.inwind.it/nn_avirex/. Numerous planes are featured, and the site has won approval from IL-2 developer Oleg Maddox amongst others.

Dutch flight sim shows announced

The dates of this year's Dutch flight simulation shows have been announced; they'll be held at the usual location, the National Aviation Museum's Aviodome, at Amsterdam Schiphol airport, on April 27-28 and October 5-6.

The focus of the spring event will be on the use of ATC in aviation and its possibilities in flight simulation, while the theme of the autumn event is still to be decided. The organisers have been in touch with Dutch civil and military ATC experts, who are expected to bring their wealth of knowledge to the show, and the DFSO will give another of their famous presentations.

Along with the release of Ubi Soft's Lock On later this year, combat fans now have something else to look forward to. Microsoft has recently announced that Combat Flight Simulator 3 is scheduled for release in the autumn and is a return to the European theatre of WWII. Several interesting features have already been mentioned.

CFS3 will use the FS2002 physics engine, and tactical bombing is said to be a feature of many of the missions. Virtual pilots will be able to fly for the RAF, the USAAF or the Luftwaffe, from 1943 until the end of the war. 18 flyable aircraft will be featured, including the first jet fighters in history.

From the current information available, it sounds as though backwards compatibility with current add-ons is likely to prove difficult, although improvements to the gMax modelling software will be incorporated. The graphics engine will apparently be completely new, so expect to have to buy a

latest-generation card to get the full benefits.

Another innovative feature will be the role-playing aspects, whereby pilots will possess attributes that can be developed during the course of the war. As time goes by, pilots will experience increased tolerance to g-forces, improving or deteriorating vision, and fluctuations in their physical health.

Online capabilities will also be expanded. Up to 16 pilots will be able to work together to achieve campaign goals, and various roles will be available in the bombers. You'll be able to host your own campaigns and mission servers, allowing the indefinite extension of a campaign. The outcome of online battles will ultimately reflect on the outcome of the campaign.



CFS3 Flyable planes

Spitfire L.F IXE	Me-262A-2a Sturmvogel	P-51B Mustang
Tempest Mk.V	Do-335A-1 Arrow	P-47D-24 Thunderbolt
Mosquito F.B. MkVI	Ho-229-0 Gotha	P-38L Lightning
Me-109G-6 Messerschmitt	Typhoon Mk.IB	B-26F Marauder
FW-190A-5/U8 Focke-Wulf	B-25C/D Mitchell II	P-80A Shooting Star
Ju-88A-4 Junkers Bomber	Vampire F.MkI	P-55 Ascender

WITH A LITTLE HELP FROM OUR FRIENDS...

Numerous readers have contacted us recently asking about useful sites on the Internet for posting questions and finding out the answers to those little (and sometimes major) problems that baffle us all from time to time. The chances are that if you've had a problem with a certain feature of a sim, a plane, or anything else, then you're probably not alone. And remember, there are likely to be fellow flight simmers out there who are scratching their heads over the little mystery you've just solved, so they'll probably be glad of your assistance while you're there!

The Flightsim Veterans Club (www.flightsimnetwork.com/flightsimvetclub) has a great FS2002 tips library, and there's a useful FS2002 FAQ at the simFlight Network (<http://simflight.com>). AVSIM Online (www.avsim.com) lists numerous discussion forums as does MicroWINGS (www.microwings.com) in their Hangar Talk section. There's plenty of good advice at FlightSim Network (www.flightsimnetwork.com), and Flightsims.co.uk have a variety of forums on their FSTalk pages.

THE MAG TRADE

It's all go in the world of flight simulation magazines. Computer Pilot (formerly PC Aviator) has acquired the rights to Flight Simulator World (formerly Full Throttle) from Arnie Lee of software publishers Abacus. Computer Pilot have announced that they will continue to publish both titles separately. PC Pilot (always called PC Pilot) wishes them luck in their endeavours. However, into all our lives a little rain must fall, and it seems

that Microwings is no more. Their website was still functioning when we went to press, but there's no sign of the magazine and e-mails to their various addresses are bouncing back. They will be sorely missed by flight simmers, and especially those who love the technical aspects of the hobby.



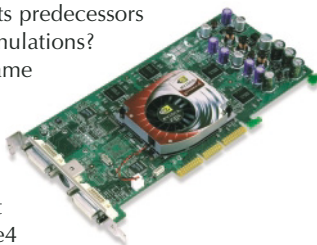
GEFORCE4 — THE NEW GENERATION



On February 6th in San Francisco, nVidia launched their latest technology in the form of the GeForce4 line of accelerators, and they should be available by the time you read this. This step is claimed to be more evolutionary than revolutionary, and the focus is on more power for existing features rather than any particular expansion in the feature set. The clock speed for nVidia's flagship Ti4600 product is now 300 MHz, up from the 240 of the previous Ti500. Memory speed has increased to 325 MHz from 240, while memory bandwidth is up more than 25%, and raw memory is doubled from 64Mb to 128Mb.

So, how does the GeForce4 range compare to its predecessors in current simulations?

Where the same amount of memory is involved, performance improvement with GeForce4 averages from 20% to 40% better than its predecessors. In short, what you see on your monitor is soon going to look even better. Refer to our article on page 62 for the implications for anyone considering an upgrade.



Greatest Airliners: 737-400 SE released

Just Flight has recently announced the release of a Special Edition version of their ever popular Greatest Airliners: 737-400. It comes with the new version of the software for FS2002 as well as a 737 video from ITVV. Owners of the Just Flight FS2000 version will be getting the upgrade to FS2002 on CD-ROM sent to them completely free of charge, as long as they've registered the software.

Xtreme Air Racing competition

Many congratulations to the winners of Issue 14's XAR competition: Andre Zelenka, Edward Solley (USA), Paul Turner, Mike Bond, Antony McEwan, Lester Robinson (USA), David Adams, R.J. Burgess, Julian Barker, and Frank Skilbeck.



Go East, young man!

Congratulations also to the winners of our recent IL-2 competition. Andy Shaw wins the signed IL-2 artwork, while the following lucky readers will receive a copy of Oleg Maddox's excellent combat sim: Paul Moloney, Don McKinnell, Kjeld Larsen (Denmark), Flt. Lt. D. Ulke, and Hrvoje Kovacevic (Croatia). A Thrustmaster Top Gun Afterburner throttle and stick will be going to Danny Watkins, Rory Heneghan, Adrian Hayward, Georges Cartenian, and Len Heath. Finally, John Sinclair, Keith Cook, Frank Heath, Miguel Paredes, and M. Parsons will each receive a copy of Mike Sharpe's Aircraft of WWII book. We hope you'll enjoy them!



IL-2 — FROM SNOW TO SUN?



Our spies on the Eastern Front tell us that 1C: Maddox Games, developers of IL-2 Sturmovik, are working on more flyable aircraft for their highly successful sim. These include the I-153, La-7, FW-190A-8 and D-9 and the Ju-87 Stuka. Additional AI aircraft include the Hurricane MKII, Bf-110, MS-406 (a French plane used by Finns), and

the IL-4. The Me 110 is also likely to become flyable in the future.

While the recent 1.03 patch fixed several problems, some users are still experiencing a 'stutter' effect. This and several other issues are under review for the next patch. Furthermore, a dedicated server patch has been developed which will be released to certified users once testing is complete.

Ubi Soft, the publisher, welcomes third-party support for IL-2, and some user-made planes and missions will be incorporated into future aircraft and mission packs. In addition, a follow-up product is in planning which will serve as a standalone sim or integrate with the current simulation. We're told that the most likely setting for this will be the Mediterranean.

PHOENIX ANNOUNCES AIRBUS ARRIVAL

Flushed with the undoubted success of their 747-400 and 777-200 aircraft for FS2000, Phoenix Simulation Software has announced the completion of their eagerly anticipated A-319/320/321 for FS2002. As you'd expect from the Phoenix team, it comes with an awesome level of detail, including a full 3D virtual cockpit, moving

surfaces on everything (except perhaps the passengers' coffee) and a huge array of liveries. It's currently available on download (prices depend on which liveries you select) from their website, www.phoenix-simulation.co.uk. A boxed version will be published by Just Flight in a couple of months.



COVER CD

IL-2 STURMOVIK DEMO

This is what we've been waiting for – the latest demo for Ubi Soft's hugely popular eastern front combat sim, IL-2 Sturmovik. PC Pilot was happy to award IL-2 our coveted 5 Star PC Pilot Classic award in Issue 14, but if you're still undecided then get your teeth into this huge demo of the sim that everyone's raving about. Unfortunately, at 146Mb it may be a struggle to download, unless you've got a very fast connection. However, you needn't worry about joining the queue for ADSL, because we've got the complete demo on CD and it really is a super piece of free software. There are six flyable aircraft, new AI planes and ground units, plus the chance to fly in multiplayer mode. All this from a demo? They must be mad! If you are one of the few who haven't yet sampled IL-2, now's your chance. You won't be disappointed!



A TASTE OF EASTERN THUNDER

It hasn't taken long for fans of IL-2 to get busy building missions, and a commercial mission expansion, by the name of Eastern Thunder, should be out by the time you read this. The author of Eastern Thunder, Viking1 to his friends (and numerous online enemies!), has kindly allowed us to include some of his custom missions on our cover CD, including a two-base dogfight map in the hills of the Kuban peninsula. Place the first two missions in your \Missions\Single\De\FW-190 directory in order to load them in single-player mode.



NACHT-BERLIN-1940

In 1940 RAF night raids on Berlin were wreaking havoc, and an experimental Bf-109 group was operating under an unnamed Major. Wolfgang Falck was sent to Dusseldorf to begin a serious attempt at forming a night fighter group. This mission recreates his

efforts, but with the FW-190 replacing the Me-110s flown by Falck and his squadron.

WINTER SCRAMBLE

The enemy is using old biplanes to harass us at all hours of the night. Early this morning we suffered an attack and moved our FW-190s off the base to protect them. A large flight of biplanes is now inbound and you have been scrambled to fend them off. Get off the ground as quickly as you can and preserve our base! Be careful in the snow... the uneven terrain has already caused too many accidents. Use one notch of flaps and WEP (War Emergency Power, in some cases methanol boost, in other cases water injection) to get off the ground quickly.

KUBAN_DF

This dogfight mission must be placed in your \Net\Dogfight directory to allow you to load the map after creating a server in IL-2.

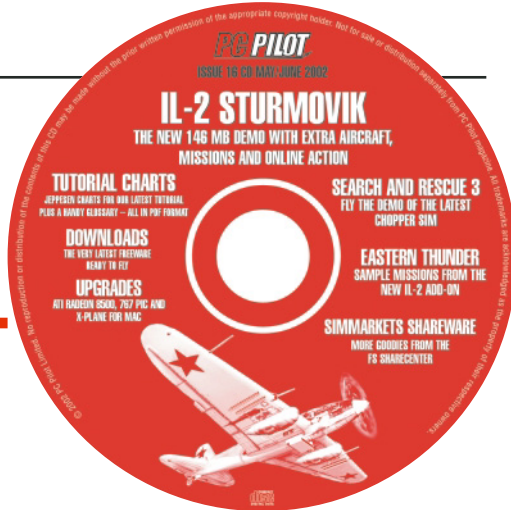
SEARCH & RESCUE 3

The US Coast Guard has once again put out the call for brave individuals to step forward and risk their lives in the line of duty. Yes, the latest instalment of the critically acclaimed SAR series is on its way. The publishers are claiming that all-new features such as a moveable spotlight, realistic audio communication, and the addition of the BK-117 and SH-3 Sea King helicopters will make Search and Rescue 3 the most realistic helicopter rescue simulation ever created. You can put the publicity to the test and take a spin in the latest demo.



DOWNLOADS

Our perseverance in seeking permission from freeware authors to include their creations on our cover CDs was rewarded with a huge influx of e-mail from readers telling us we'd done the right thing! For this

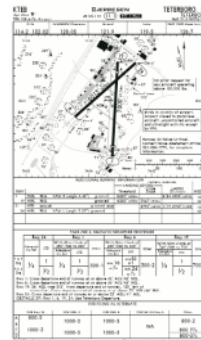


issue we've again included as many files as possible from our Downloads section on the cover CD. The watery theme of this issue continues with, among others, a fantastic Ju-52 with floats as one of the featured files. Regular problems that you've experienced involving costly Internet connections and elusive websites should all be a thing of the past. There was a full feature on how to install files in the last issue, for those who are still struggling in this area.



CHARTS

The charts for our latest tutorial are included on the CD in easy-to-use PDF format. If you have any trouble accessing the charts go to 'My Computer', right click on the CD icon and select 'Explore'. You can then open the folders as required. Many of you have written to us asking for information on how to understand the various symbols used on Jeppesen charts. Back in the dim and distant mists of time (Issues 3 and 4, actually) we compiled a complete glossary for Jeppesen charts, and we've included it as a PDF file in the Charts folder on this CD. We hope you find it useful. To view this, or the high-resolution versions of the Jeppesen charts used for our tutorials, you'll need Acrobat Reader, which is also included on the CD.



UPDATES/UTILITIES

ATI RADEON 8500

We've seen quite a bit of discussion in recent weeks about problems experienced by readers using FS2002 with ATI Radeon

8500 graphics cards. The main issue seems to be flashing and missing textures, and there are now a couple of updates on the ATI website, which seem to work for some people if not for everybody. We've included the ones for Windows ME and XP on the CD. The driver labelled 6_13_10_6015 is for XP and 4_13_9009 is for Windows ME. For further information go to www.ati.com/support/infobase/3953.html or www.ati.com/support/issuetype/games.html.

Other graphics card fixes for FS2002 can be found at <http://support.microsoft.com>. Just find your way to 'Flight Simulator 2002 Known Video-Related Issues'.



767 PILOT IN COMMAND

There's now a patch to get this excellent 767 software working in Flight Simulator 2002.



PETER DOWSON'S UTILITIES

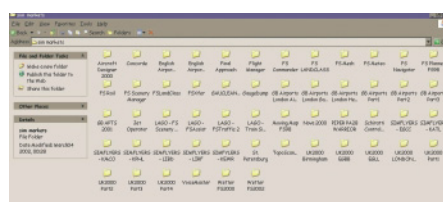
For those of you who like to tinker, we've included all Peter Dowson's latest utilities on the cover CD, including Advdisplay, WideFS, FSUIPC and a guide to FSUIPC in French for anyone over on that side of the Channel.

X-PLANE FOR MAC

As X-Plane was (and is) developed for use on a Macintosh, we normally include the Mac updates. On our last CD there simply wasn't enough room so, for all you Mac users, here's 5.99 and 6.06 for Mac.

SHAREWARE

There are lots of programs around that you can try before you buy, and the place to go for them is the FS Sharecenter, which is part of the simFlight Network at www.simmarket.com. Here's what we were unable to fit on the Issue 15 CD for you to try. To find out all about this software, for costs, and to register, go to www.fssharecenter.com or www.simmarket.com.



VIRTUAL AIRLINES

For reasons of space we can no longer include our Virtual Airlines page at the end of the magazine. However, we've put the latest list of VAs on the CD and also included a small description of each one to help distinguish between all these great online airlines.

WINZIP & ADOBE READER

You'll need these important utilities to open up zip files or read PDF files that are on the CD. Please note that any shareware should be paid for and registered if you want to use it on a regular basis.



IMPORTANT - TECHNICAL SUPPORT

The CD and software on it is free and as such, neither PC Pilot, nor any of the publishers or developers of the software supplied on the CD can provide technical support. The software is supplied very much 'as is' and without support. Enjoy the CD and the software on it!



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Lock On: Modern Air Combat

Good sims come to those who wait!

In autumn last year we took a quick look at Lock On, the long-awaited sequel to Ubi Soft's acclaimed Flanker 2.0. Back then it was expected that that Lock On would precede IL-2 but, as it's turned out, the superlative IL-2 is currently winning accolades from every quarter while Lock On remains in the development hangar. Impressed by what we saw earlier, we asked Ubi Soft if there were further developments to report and, from what they tell us, it sounds like Lock On is going to be very special indeed. Until it arrives, keep an eye on the website at www.lo-mac.com and enjoy the screenshots; we'll let Ubi Soft's Matt Wagner take it from here and tell us what we've got to look forward to...



Seriously detailed MiG-29

Projected release date

We expect Lock On to be completed sometime in the summer or fall of 2002; this is about as precise as we can be at this time. A great deal of time and resources have been expended on optimising the old Flanker 2.x code to fully support DirectX 8, the new line of graphics card GPUs, and the code base. By the time Lock On is complete, the base engine will be almost rewritten, to allow much greater graphic detail, faster frame rates, and the creation of missions with far greater numbers of objects than was possible in Flanker 2.x. A lot of time has gone into recreating the F-15C and A-10 in detail; actual flight manuals have been used for both aircraft to create the most detailed modelling of these aircraft ever done for a PC simulation.

The aircraft

Lock On will include fighters, attack aircraft, bombers, tankers, AWACS, transports, helicopters and more. Each aircraft has been created with very detailed 3D object models and texturing, and each includes accurate animations such as landing gear, flaps, airbrakes, and so on. Flyable planes will include the F-15C Eagle, the A-10A Thunderbolt II, the Su-27 Flanker B, the Su-33 Flanker D, the MiG-29S Fulcrum, the MiG-29A Fulcrum (both Russian and German versions), and the Su-25 and Su-39 Frogfoot. These encompass an array of both air-to-air and air-to-ground combat aircraft for both US and Russian forces, allowing a broad range of combat missions. Over 40 non-flyable planes will also be included.

Locations and scenery

Operations take place in the Black Sea region, with the focus on the Crimean peninsula and the Caucasus region. This includes farmland, foothills, towering mountains with snowfields, deep canyons, and highly detailed towns and cities. Very detailed ground textures will be used that range from 30 to 5 cm resolution. There will also be power lines, millions of individual trees, roads, railways, rivers, and moving bus, car, and railway traffic. Lock On will also carry over some naval content from Flanker 2.x to include operations from the Russian aircraft carrier Kuznetsov in the Su-33.

Online features

Lock On is being designed to support 32 players, at a minimum, for both head-to-head and co-operative play. Depending on your connection, Lock On will use one of two data transfer techniques that are designed to optimise gameplay according to bandwidth. One of the biggest draws will be the ability for sides to compete against each other in both Russian and US aircraft, and players will also be able to fly co-operatively in different types of aircraft. For example, a mission could be created in which one side flies American F-15Cs



The Warthog – we think it's lovely!



F-15C – the Eagle in flight

escorting A-10s while another defends their airspace with Russian Su-27s and MiG-29s. The mission editor will allow the creation of endless multiplayer possibilities.

A new online interface will allow clients to select a side and then browse and select ongoing flights; if they don't wish to join any of the predetermined flights, they'll be able to dynamically add their own flight to the mission.

Outstanding features

The primary selling points of Lock On can be divided into four general areas:

Broad scope: Rather than focussing on a single aircraft, or including many aircraft at

a low level of fidelity, Lock On will allow players to fly eight different aircraft, each modelled to a very high level of detail; it will be the first such simulation to combine the depth of a 'study' simulation with the range of aircraft of a 'survey' simulation. The choice of aircraft will also allow a wide range of missions so that you can experience the differences in capabilities of these top-of-the-line fighters.

Immersive gameplay: Lock On will go to great lengths to create an immersive environment that will let you experience what it is to fly these impressive machines. Lock On will introduce the best graphics ever created for a flight simulation; players will hear radio messages from wingmen, AWACS,



Amazing water and lighting effects under an Su-25



Real 3D quality in the Flanker B cockpit

tower controllers and tankers, and the full dimension of sound effects that the pilot would hear in the cockpit will be available.

Scaleable gameplay: Lock On is designed to appeal to both the novice and hardcore user. The novice user can select very easy flight dynamics, object labels, and easy-to-beat AI levels, while for the expert user there'll be an authentic avionics system with the most realistic flight dynamics ever created for a fighter jet simulation.

Gameplay: In addition to being a highly realistic simulation of modern air combat – if the player so sets their options – Lock On will also encompass elements that will contribute to the elusive simulation 'fun factor', including detailed briefings and debriefings, a mission video recorder, quick missions, a fast battle planner, a pilot logbook, the ability to earn promotions and medals, and a thorough syllabus of training missions.

The development team

The development team is Eagle Dynamics, located in Moscow, Russia. It's composed of

about 35 personnel and they are responsible for both Su-27 Flanker and Flanker 2.0. Team members have an amazing list of backgrounds, including doctorates in physics, mathematics, aeronautical engineering and computer science. There are also several former military pilots on the staff.

Missions and campaigns

Missions can be divided into five modules, including:

Single missions: Missions created by the user with the built-in mission editor. Missions will be included for each of the flyable aircraft, and will follow the storyline of a fictitious conflict in the Black Sea; they will increase in difficulty and will be designed to maximize action and engaging gameplay.

Training missions: After a UPT (Undergraduate Pilot Training) section for both US and Russian aircraft, players can choose from a detailed syllabus for any flyable aircraft. These missions will range from basic navigation to weapons employment. Once the user has mastered

these, Advanced and Top Gun training missions will be available to tune their combat skills.

Quick Start: Those who want to get in the air without any fuss will be able to select their aircraft of choice and a few basic settings.

Fast Battle Planner: The FBP allows you to create a mission by selecting from about 20 scenario options; it's an intuitive tool to create detailed missions without the trouble of learning the mission editor.

Dynamic Battle Generator: This is the core of Lock On, and dynamically creates an ongoing series of missions. You can choose to fight a DBG session for either side and select the mission type. After selecting your persona, you can manually select the regional disposition of sides and the actual country composition for both coalitions. Once the stage is set for the conflict, you then fly a series of missions with the goal of capturing the map region by region. Each region is composed of a variety of ground targets with the central target being an enemy airfield. Once the enemy airfield has been destroyed, you move operations on to the next region. If you're killed during the conflict, or run out of resources, you'll have lost the DBG war, during the course of which you can earn promotions and medals.

Modern jet combat compared to traditional dogfighting

The nice thing about modern jet combat is that you can do everything available in a World War II simulation, and even more. Although most jet fighters carry air-to-air missiles, it is quite easy to set up missions in Lock On that are guns only. For those wanting more, a variety of air-to-air missiles can be loaded in order to add new dimensions. So, a player can choose between a guns-only dogfight experience and an authentic recreation of modern air combat with its host of guided missiles and countermeasure systems.

Lock On is uniquely positioned at a time when the market is ripe for a quality flight simulation that fulfils the desires of the majority of flight simulation enthusiasts. Combined with the drought of similar products and the new advancements in hardware, I believe that Lock On is going to be a hit not only with the established simulation community but also with those who have previously overlooked such titles. ■

Matt Wagner

Preview Information

Publisher: Ubi Soft

Price: TBA

Website: www.lo-mac.com

Developer: Eagle Dynamics

Expected Release Date: Summer/autumn 2002

St Petersburg 2002

Flawed Russian realism

We'll begin by saying that while a product can itself be very good, it's sometimes difficult to recommend unreservedly for any number of reasons. Some of these are not necessarily the fault of the developer, because they are all obliged to work within the constraints imposed on them by the available hardware and, in the case of FS2002, the host software as well.

So what we have here is a brilliant piece of scenery design for one of the major Russian airports that, under present conditions, is sadly almost unusable. We say almost, because FS2002 can be fully customised, of course; you have the option of reducing the screen resolution, level of texture detail, and many other elements that determine just how well it functions. This should allow you to explore these design epics without reducing the display to the level of a slide show, which is exactly what we saw on our review machine when we tried to run the St Petersburg scenery with all the display settings maxed out.

This PC, incidentally, is no slouch, but a fully loaded Athlon 1800XP, with 512Mb of RAM and a GeForce2 GTS video card. Three frames a second, however, is not



Now that's a city!

really flyable, so we started dropping goodies until it reached a reasonable level, ending up at a screen resolution of 800 x 600 with most of the settings reduced to medium. We also had to drop features such as shadows, and reduce the visual distance to 80 miles; this made a huge difference to the performance, which rose to a respectable 8-9 frames per second around the airport, and to anything between 12 and 22 frames per second on approach.

The reason we've explained all this is because the layout and overall design of this scenery is excellent, with dozens of custom buildings, new textures, and more vehicles and other associated clutter around Pulkovo airport than we've ever seen before. It really is a pity that you'd be hard pressed to find any combination of hardware and software that could do it justice. In any event, we decided to take the screenshots at a high resolution to give you the full benefit of the author's work.

Should you wish to check out the package yourself, it's available as shareware, so you do get the chance to try it on your own system before you have to register it. While only the Pulkovo airport is currently included, the Rzhevka airport and up to four others in the St Petersburg area will soon be available in a separate file, which will be free to registered users.



The main terminal – very impressive



No queues for the departure lounge

The author, to be fair, is not unaware of these issues and has made a few provisions to help you get the best from your own particular setup. The installation, for example, can be completed in three stages, depending on the level of complexity you require. He also provides a comprehensive installation document that explains how you can remove specific elements to improve your frame rates. So, although it's certainly a frame-hogger, we think it's well worth a look, all the more so in view of the current dearth of scenery for this part of the world.

Joe Lavery



The Pulkovo tower



Have you ever seen so many vehicles in an FS airport?



Looks like a Tonka parking bay

Review Score

Publisher: SC Technology & Computers

Price: £12.00 (approx.)

Website: www.fssharecenter.com/stpete/

Developer: Sergay Carr

At a glance: A highly detailed scenery add-on, but not designed for the low-end PC user

System Requirements: PIII 350MHz, 64Mb RAM, 35Mb hard disk space, 3D graphics card

Recommended: P4 or AthlonXP 1800MHz+, 512Mb RAM, 64Mb 3D graphics card

Mosquito Squadron

633 Squadron is now showing on a PC near you!

Imagine that it's 1941 and you're running the RAF. How would you fancy a new aircraft that could fly nearly as fast and as high as a Spitfire, carry almost the same bomb load as a Wellington (and more than a B-25 Mitchell), that only needed a crew of two and could also be used for long-range photo-reconnaissance or as a night fighter? Oh, and it should be made of something cheaper than steel or aluminium. Surely a pipe dream brought on by too many long nights counting the Blenheims and Whitleys back home? Certainly not!

The de Havilland Mosquito, which is loosely described above, was probably the most effective multi-role aircraft of its day, and few people realise just what a significant contribution the 'Wooden Wonder' made to the effectiveness of the RAF from 1941 right up to the end of the war (and beyond). The 'Mossie' was originally conceived as a private project by de Havilland that almost never happened, but luckily a prototype took to the air in 1940 and, as with the Blenheim in 1935, the Air Ministry observers were shown a privately funded aircraft that could outperform anything on the front line. An order was quickly forthcoming and the rest is history.

Mosquitoes took part in some of the most daring raids of the war, including bombing Gestapo HQ in Oslo, freeing Resistance prisoners from Amiens Jail (OPERATION Jericho) and even attacking two parades in Berlin on the same day (one organised by Goering and the other by Dr. Goebbels) during broad daylight. When they weren't engaged in this sort of derring-do, Mosquitoes were used as bombers, pathfinders, night fighters, for photo-reconnaissance and as fighter bombers. It is this latter version of the Mosquito that the Blue Arrow development team have produced as an expansion for FS2000/2002 and CFS2, to be published by Just Flight early in April.



A traditional cockpit view



It defines the term 'a hail of bullets'



The Mosquito FB. MkVI at RAF Methwold

We've had a look at a recent version of the software and, as you can see from the screenshots, the external views show a huge amount of detail. The package contains just one aircraft, a Mosquito FB. MkVI, which carried guns, bombs and rockets. To give you an authentic base to fly from, there's also scenery of RAF Methwold and the village of that name. If you fly in CFS2 you'll also get 21 missions based on actual sorties carried out by Mosquitoes.

The likely retail price is going to be £24.99, so the aircraft will need to be quite a special one to justify the same cost as other programs that contain more aircraft or something as complicated as a modern airliner. However, from what we've seen so far, the detail is exceptional, the virtual cockpit and panels are extremely accurate and the flight model has undergone extensive tests. There will also be a complete printed manual (which you won't



The squadron is airborne

find in many other programs) produced to the usual high standards that we've come to expect from Just Flight. Add to this the scenery and CFS2 missions and it adds up to quite a comprehensive offering.

The Mosquito was undoubtedly one of the most exciting aircraft operated by the RAF (the last one went out of service in 1961) and a version of this high-performance machine that we can take for a spin in our flight simulators has been long overdue. ■

Derek Smalls

Preview Information

Publisher: Just Flight

Price: £24.99

Website: www.justflight.com

Developer: Blue Arrow

Expected release date: April 2002

Visual Flight UK & Ireland Terrain Mesh Scenery

River deep, mountain high

The 'As Real As It Gets' claim on the advertising for Flight Simulator 2002 was bound to come in for some flak, particularly as there are thousands of amateur designers out there doing their best to refute the claim ever since it was released. We don't have to delve too deeply to be reminded of the shortcomings of the program, because every issue of PC Pilot is full of products dedicated to making Microsoft's claim finally come true.

This brings us to a new, or should we say updated, product from Visual Flight that pushes the realism factor up a few more notches in the form of a new mesh scenery that covers the British Isles in their entirety. The author, John Farrie, tells us that he has used a new formula for creating this scenery that is quite different to other similar products, and enables the file sizes to be much smaller while retaining a high level of detail. The result is that there is very little effect on those all-important frame rates.

We tested the validity of this claim by visiting a variety of areas around the

country, where we paused and then saved the flight for the purposes of comparison. If you look at the screenshots you'll notice the differences which, obviously, are more noticeable in the mountainous areas; a flat plain is always going to be a flat plain! John has incorporated some clever design in his scenery, however, to force FS2002 to use a more subtle range of textures so that you don't notice those sudden and unrealistic changes in the landscape.

He also maintains that his mesh is far more accurate in terms of elevation than the default scenery. This will make your VFR flying more realistic, which is an important issue, particularly if you're using FS2002 for flight training.

Armed with a tape measure, an ICAO 1:500 000 aeronautical chart and a digital camera (Paint Shop Pro screen capture actually), we installed the single BGL file and climbed aboard the default King Air 350. In all the areas we tested, the spot heights were more accurate in John's scenery than in the FS2002 default scenery. But what is more

interesting is the overall effect produced when there are subtle changes in the textures; it's simply a much better rendition that unfortunately our screenshots can't really do justice to. In order for you to see the full effect yourself, demo scenery of the Lake District is available from the Visual Flight website.

Joe Lavery

Review Score

Publisher: Visual Flight

Price: £17.99 (download) or £22.99 (CD)

Website: www.visualflight.co.uk

Developer: John Farrie

At a glance: Complete coverage of the British Isles, and a significant improvement in the realism factor for UK flyers.

System Requirements: PII 500MHz, 128Mb RAM, 16Mb 3D graphics card

Recommended: P4 or Athlon XP 1000MHz, 256Mb RAM, 32Mb 3D graphics card

Subtle rather than spectacular

As you can see below, the Visual Flight scenery (the lower screenshots) has a far more pleasing and accurate look to it. The improvement is not breathtaking, but it's a huge improvement on the default and will delight VFR pilots.



Derwent Water



The Lake District



Scotland

Combat Jet Trainer

TLK-39C & L-39ZA Albatros



It's a rare, yet pleasant, experience when a product not only surprises you, but ultimately exceeds any expectations you might have had of it. Rather than being 'just another add-on' whose existence had largely passed us by, Combat Jet Trainer left us feeling immensely pleased that we'd taken a proper look at it.

Learning to fight and fly!



What a cockpit! The kneeboard is a nice touch



Up, up and away!

Combat Jet Trainer TLK-39C & L-39ZA Albatros (easy for you to say, Ivan!) is an add-on for Flight Simulator 2000/2002 and CFS2 which focuses on a second-generation Czech jet trainer which first flew in 1968. The plane has seen service in such diverse air forces as those of Russia, Afghanistan, Algeria, Bulgaria, Iraq, and Vietnam. Combat Jet Trainer was created by the team at Captain Simulations, who are not only former fighter pilots themselves, but also helped create full-blown TLK-39 simulation software for the Ukrainian Air Force.

The TLK software has up to now only been available as a download from the Captain Simulations website (www.web-captain.com), and came in several flavours, allowing you to purchase and download the various aircraft and Konotop Air Force Base scenery separately, or as a complete package. It won critical acclaim in this form from around the flight simulation world, and now the complete product is available on CD from Just Flight, with a full installation program, printed manual, and interactive HTML manual.

Installing the complete program from CD is considerably easier than the download version and, once loaded, it's time to take it for a spin. Don't forget to reset everything to metric – no gallons or pounds in the Ukraine. We tested the aircraft in both FS2002 and CFS2, with more time in the latter because of the missions that are included. Both simulations serve to show off the amount of detailed work that obviously went into the graphical modelling of Combat Jet Trainer, and it's truly jaw-dropping!

The cockpit of the L-39 is a thing of pure beauty; it's a fully clickable cockpit, with every working gauge and dial at your disposal. The gauges are particularly noteworthy; rather than being just simple representations of the actual dials and pointers, the gauges are fully modelled to give a beautiful 3D effect – more like CGI panels than cartoon panels, to paraphrase one famous developer. The cockpit, when looked at from any angle, is truly photorealistic, with no minor detail overlooked. Unfortunately there's no virtual cockpit with the L-39, which indicates its FS2000 heritage but, in all honesty, it isn't missed.

With fully active landing gear, a moving canopy, and properly represented control

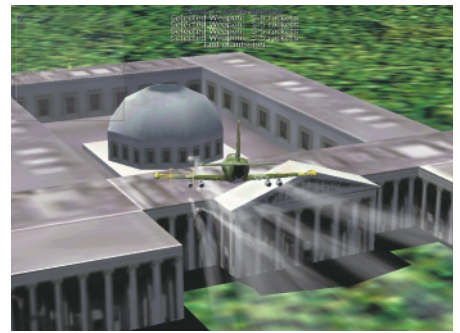
surfaces, this aircraft is as much a joy to behold from the outside as it is inside. Different 'skins' are included with the aircraft, and both the USSR and US Navy variants show off the detailing admirably.

We can honestly say that the L-39 performs like a true champion. Being an 'older' aircraft by modern standards, it's not incredibly manoeuvrable, but it does well enough. Twenty-one combat missions, against both air and ground targets, are available for CFS2 users, and these are designed to help you 'learn' combat skills, just like the real L-39 pilots. The CFS2 version of the L-39 includes four weapon loadouts, including guns, rockets, bombs, and external fuel tanks; the flight model actually takes into account the difference in weight and aerodynamics of these extras, and you'll find the handling is affected in relation to how much ordnance and fuel is taken on board. This principle will be quite familiar to airline pilots, who are accustomed to the effects of fuel and passengers measured by the ton, but to anyone used to just jumping in a Spitfire with unlimited ammo and fuel, you might be in for a surprise – do not adjust your set!

In a dogfight, the L-39 is a competent, if somewhat ungainly, fighter. Too much 'turning and burning' will find you stalling easily; stalls are actually modelled very well here, with the point being to induce the correct levels of fear and respect in the novice pilot – it certainly worked in our case. Because of this the L-39 performs better when pitted against slower targets and objects on the ground.

We took the L-39 on several sightseeing flights in FS2002; Los Angeles to San Francisco, and Paris to London were both immensely enjoyable experiences, thanks to the great flight model and cockpit graphics. You probably don't see many of these aircraft whizzing up the Champs Elysees, but then that's the beauty of flight simulation. Unfortunately, FS2002 doesn't allow for the extra loadouts that affect the flight model, but this is a minor omission which is hardly missed.

The included scenery consists of Konotop Air Force Base, located near the border between the Ukraine and Belarus; The real base is used as a training centre for the Chernigov Higher Fighter Pilot School. The scenery is well executed and includes



Some ground targets are difficult to miss

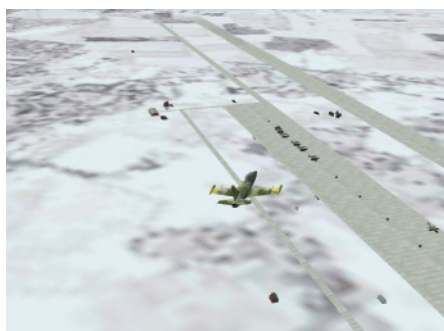


Load up heavily and the handling will suffer

dynamic air and ground traffic, at least in FS2002, as well as buildings and radar masts. It's probably not modelled to the same level of complexity as somewhere like Heathrow, but then the same could be said of the real Konotop! Nonetheless, it's a worthwhile addition to the package.

Do we think Combat Jet Trainer is worth the money? With a little negative spin, we could say that it's only one aircraft in a few different liveries, with a single airport and 21 missions for CFS2. But that would be missing the point. In download form it would set you back about £22.00 (not including the cost of the phone call) and you'd need to install everything manually. For a little more you get the same beautifully detailed aircraft, the scenery and missions, and a printed manual. This must be one of, if not THE, best single-plane additions of this type that we've flown for the Microsoft simulation family. The amount of care and detail lavished on this package is immediately apparent, and it should appeal to anyone who fancies flying something slightly different.

Brian Rubin



Winter draws in, as they say in the Ukraine!



CFS2 Liberators are handy for target practice

Review Score

Publisher: Just Flight

Price: £24.99 (£22.00 for download version)

Website: www.justflight.com

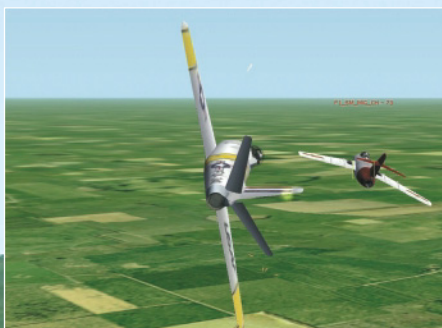
Developer: Captain Simulations

At a glance: One of the finest expansions we've ever had the pleasure of flying. No virtual cockpit, but then neither has the real one!

System Requirements: PII 400MHz, 64Mb RAM, 16Mb 3D graphics card

Recommended: PIII 800MHz, 256Mb RAM, 64Mb 3D graphics card, 3D sound card

Sabre vs. MiG



*Goodbye props -
hello turbines!*



Creating commercially available add-ons for Microsoft's line of flight simulators, whether the civilian or combat editions, can be a tricky business. On the one hand, you want to provide enough new content and/or technical innovations to justify the purchase, but are limited at the same time by the constraints of the simulation for which the expansion is designed.

One such simulation is Microsoft's Combat Flight Simulator 2. Given its open architecture, similar to that of the original Flight Simulator, commercial add-on developers have had a field day.

Two questions we always ask when looking at these expansions are, "Does it add enough to the original sim to warrant its purchase?" and "Does it improve the overall experience of the simulation?" These are the questions we'll try to answer as we look at Flight One's Sabre vs. MiG, an add-on that covers a portion of the air conflict during the Korean War. Available as a download from Flight One's website, or boxed from Just Flight, it includes new scenery, new missions for CFS2, and twelve aircraft of which seven are flyable. We decided to look at two aspects of the program: its content, and its technical features.

Sabre vs. MiG includes twenty missions – ten for the USAF and ten for the North Koreans – which attempt to recreate actual combat missions over Korea during the conflict. While the publicity also boasts of campaigns, these are simply a small string of the single missions grouped together according to their common features, such as 'Air-to-Air' or 'Air-to-Ground', so discussion of any proper campaign structure would be a moot point.

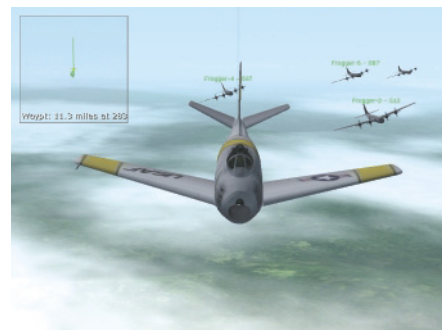
The missions themselves are something of a mixed bag. While there's fun to be had in a few of them, some of them seem oddly



Superb external detail on the F-86



The MiG's virtual cockpit is a joy to behold



Guarding the B-29s



The P-51 is now an F-51 but it's still a Mustang to us!



Shinju Airfield is about to have a bad day

scripted. There were, for example, at least two missions on each side where nothing actually happened – no combat, no dogfights, nothing! This was both with and without the disabled warp function. Also, even when nothing happened during a mission, the debriefing screen reported the mission 100% completed, which seemed a little odd!

During actual combat, either with opponents on the air or on the ground, the missions did get heated, but at the same time we felt disconnected from the action. Since there's no continuity between missions, whether attempted singly or in the campaigns, we felt little sense of involvement or of actually contributing to any major war effort, which made any victory seem hollow. Overall, the content of Sabre vs. MiG isn't bad, but it does leave much to be desired. A leaf should be taken out of the (£5.00 more expensive) Combat Aces book, where the missions (70 of them) come together in a much more interesting campaign structure.

From a technical point of view, Sabre vs. MiG fares much better in most respects. Included with the add-on is some custom Korean scenery and seven new flyable aircraft; the seven are actually made up of three F-86 Sabres, three MiG-15s, and one F-51 (the USAF designation for the Mustang). The only real differences found between the aircraft variants were their skins, so we actually only get three new aircraft to fly. The planes themselves are very well put together; the cockpits are highly detailed, the virtual cockpits are seamless and functional for the most part, and the external views are excellent. We noticed that one website, not renowned for its 'combat' content, gave the aircraft in

Sabre vs MiG an award of excellence. We'd certainly concur with that, but the aircraft design isn't the whole story.

The aircraft not only look good, but fly adequately as well. When comparing the flight models with the Korean Air benchmark, Rowan's MiG Alley, the results were nearly identical. It's no small feat to achieve realistic jet flight in a sim created for propeller-driven aircraft. The planes fly realistically, stall incredibly well, and model damage correctly. Gun ballistics and the resulting damage are also well modelled, as are secondary weapons such as rockets and bombs. The MiG-15 is the only aircraft armed with cannons as well as machine guns, and the differences between the two are handled nicely.

The scenery is also a credit to the developers, and looks great at altitude. While it does get blurred when flying low, this is a limitation inherent in almost all flight simulations, so it's not really fair to hold it against an expansion. Objects on the terrain, such as buildings, trains and trucks look decent but fairly bland. Included with the software, as a bonus, is a program called Combat Clouds; this adds more realistic clouds to CFS2, and is incredibly easy to install; although they're simple 2D clouds, they certainly look better than the originals.

While the technical aspects of Sabre vs. MiG are as good as you'd expect, some small problems are apparent. Firstly, warping to a target area is, by default, disabled. While this can be enabled (directions for this can be found at www.flight1software.com/svmfaq.htm), this was a perplexing exclusion. Without warping, missions could drag on for hours, with nothing to do between combat (if there was any) but adjust the trim. It's not a hard problem to solve, but the reasoning behind it is still mind-boggling. There are some graphics and sound glitches also, such as an absence of audible wingman commands while flying as the North Koreans, flickering/disappearing virtual cockpits, and missing landing gear whilst on the ground.

Overall, Sabre vs Mig is not a bad add-on, but then it's not an excellent one either. While playing through the missions, the feeling of needing to keep going for 'just one more mission' was decidedly absent.

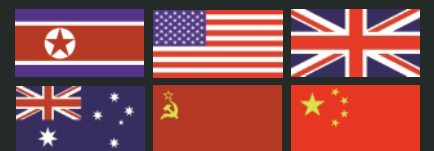


Those rattlers will wish they'd stayed in Train Sim

The North/South Divide

The Korean conflict began during the summer of 1950, with the North Koreans crossing the 38th Parallel in an apparent invasion of South Korea. In two days, the North Koreans marched on Seoul, prompting a US evacuation and entry into the conflict. The newly formed United Nations, 'led' by America, rushed to the defence of South Korea while Communist North Korea was ably propped up by Russia and China. The first US aircraft on the scene were some relatively obscure F-82s sent over from Japan, while the North Koreans were flying vintage Yak aircraft from World War II. The first aerial victory of the war consisted of a squadron of F-82Gs downing two Yak fighters two days after the conflict began.

Eventually jet aircraft were introduced into the theatre; for the US it was the F-80 Shooting Star, while the North Koreans began to receive new MiG-15s. America later introduced the legendary F-86 Sabre into the conflict, evening out the odds in the air war. The conflict lasted until 1953, with huge American and Communist casualties in addition to those suffered by British, Australian and other nationalities.



Technically, it's perfectly competent, but for sheer fun we have to say it falters. We'd recommend it only if you wish to fly with Korean-era aircraft within the confines of CFS2. Comparisons are bound to be drawn with Just Flight's other Korean offering – Korean Combat Pilot. This was originally designed for CFS1 and re-written for CFS2, which showed in some dated aircraft designs. However, it included 14 different aircraft and extensive scenery. Sabre vs MiG is undoubtedly better than KCP from a technical standpoint, but it doesn't add much to the idea of a Korean add-on. If it's intense Korean air combat you're looking for, MiG Alley (if you can find a copy) is still probably a better bet.

Brian Rubin

Review Score

Publisher: Just Flight/Flight One

Price: £19.99

Website: www.justflight.com

Developer: Flight One

At a glance: Sabre vs. MiG gets it technically right but, content-wise, it's got a way to go before it rivals other expansions we've seen, even for a fiver less.

System Requirements: PII 300MHz, 64Mb RAM, 16Mb 3D graphics card

Recommended: PII 450MHz, 128Mb RAM, 32Mb 3D graphics card

SIMCharts v2.0

IFR Essentials

If you are enthusiastic about instrument flying and want to have any realism at all, you need the appropriate plates for your flights. The ideal way to do this would be to buy the relevant Jeppesen airways manuals, but just to cover Europe in this way will cost you nearly £900.00. Reduce this coverage just to the British Isles and the price falls to £160.00; these come with monthly updates to make sure that you are always flying with the latest plates. The next best thing, and much more affordable, is to use a software version, and the best of these is produced by Jeppesen, the world's leading supplier of flight information and flight planning services.

The SIMCharts are a fraction out of date, but even when you carefully compare them to the real thing, the changes are minor and rarely likely to affect your flight. The locator, for example, may be referred to as NDB(L) on the SIMCharts and Lctr on the real thing. There are occasional significant changes, such as the ident code for a beacon, but on all of those tested the SIMCharts matched FS2002, which is what they are claimed to do.

Purchasers of SIMCharts get a single boxed CD, and during installation you select the particular region(s) you want. You can pay for one region only or for three, and combination packages are also available for each US and European region; these include the CD of the terminal charts with additional paper en route charts.

We tested a 'One Region' package and installed Europe; installation was as easy as it gets, and the package integrated with FS2002 perfectly. All the data is stored on the CD, but there's a simple facility for transferring the data for up to ten airports to your hard drive. If you want to add any more, you'll have to remove the same number from your hard drive first. This swapping is exceptionally easy, despite the airport search not working properly on the Windows XP server. What's more, you can access the data directly from the CD if you want. This might well be the easier option, as charts for any airport in FS2002 are available.

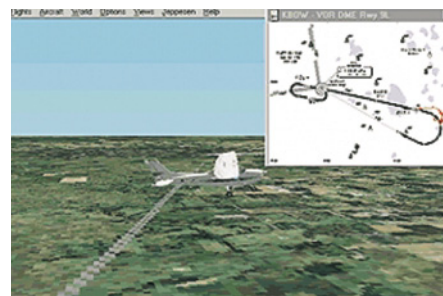
The onscreen quality of the plates will be dependent on your hardware but, when showing a whole plate on a 19-inch monitor at 1024 x 768, the plate text was largely unreadable. With sufficient

magnification it was easily legible, but then only a part of the plate can be seen. This is not particularly relevant because you will want to print out the chart for use, and the print quality is superb.

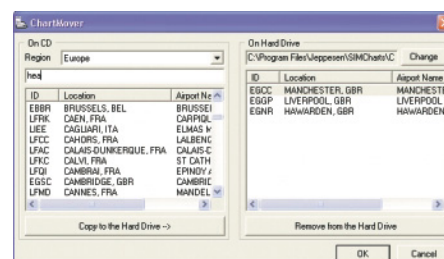
A 'Jeppesen' menu item is added to FS2002, which allows a plate to be displayed during flight; you won't be able to read every detail, but you can see the track you should follow. Once you've selected a plate, your path is plotted on it, even if you hide the plate. This means that you can fly your SIDs, STARs and approaches either using the chart as a guide, or to check your flight tracks later to see how your flying shaped up.

This package is well designed, and makes information of a professional standard available to the flight simulation pilot at a reasonable cost. Quite simply, it's a 'must have' package for anyone who takes their instrument flying seriously.

Stephen Heyworth



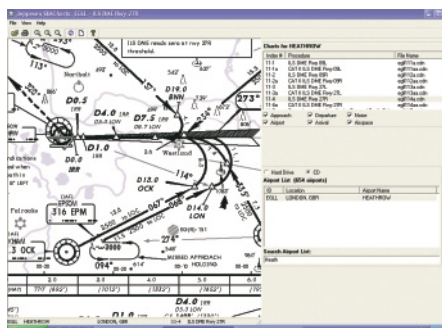
Once you start using SIMCharts, you won't want to fly without them



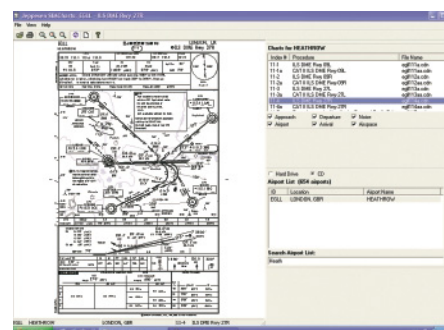
ChartMover – the simple utility for transferring files between CD and hard disk



Using SimTrack to check your accuracy when flying an approach



A Heathrow plate shown at full magnification



A Heathrow plate shown as a full page

SIMCharts regional installation options

Canada / Alaska
Western US
Central US
Eastern US
South America
Europe
Africa
Eastern Europe / Middle East / Asia
Pacific / South Pacific / Australasia

Review Score

Publisher: Jeppesen

Price: £22.00 approx. (One region)
£46.00 approx. (Three regions)
£39.00 approx. (Combination package)

Website: www.jeppesenpcpilot.com

Developer: Jeppesen

At a glance: A superb professional's package for instrument flying. Fantastic value when compared to the alternatives.

System Requirements: FS2002

Warbirds Extreme

Four aces in the pack

There are very few lucky people who get the chance to fly exotic aircraft such as Lear jets, or even prop classics like the Beech King Air 350, and when it comes to the aircraft that have us all running to the window, or craning our necks as they streak across the sky, then you're talking about an even more elite band of pilots. If your day happens to consist of taking control of some awesome firepower at twice the speed of sound, and you're getting paid for it, then you're probably a jet fighter pilot.

This latest release from Abacus is designed to feed the appetite of those who dream of just such an existence, and it consists of four

of the most powerful warplanes on the planet. In addition to the mighty Fairchild Republic A-10 Thunderbolt (affectionately known as the 'Warthog'), you can fly the most successful fighter-bomber of all time, the McDonnell Douglas F-15 Strike Eagle, a powerful and strong aircraft with the distinction of having never lost a pilot in a combat situation. If the Strike Eagle is the iron fist, then the Lockheed Martin F-16 Fighting Falcon might be compared to a racehorse; it's another beautiful aeroplane, with classic lines and an agility that few opponents can match. The final place in the line-up is taken by an aircraft that until recently was a well guarded secret – the Northrop Grumman B-2 Spirit stealth bomber, nicknamed the 'Flying Wing' after its unique and unusual design.

The Warbirds Extreme package is an aircraft-only product for FS2002 and CFS2. It's billed as containing eleven aircraft, but in fact there are only four; the F-15 and F-16 are available as single and twin-seat variants, and the F-16 is provided in seven different liveries, which probably explains the maths. Some custom missions for CFS2 would have been a welcome addition to the package and provided better value overall.



Just how does that thing fly?



The Warthog – "Who are you calling ugly?"



The mighty F-15 Eagle

As the screenshots show, the modelling is of a very high standard and each aircraft comes with its own dedicated panel. The instrumentation is somewhat basic, however, consisting of just the primary flight instruments in some of the aircraft. All those MFDs and push buttons are purely for show. The worst of the bunch is the B-2 Spirit panel, which is decidedly lacklustre and looks very much like it was designed by a committee. Does it really look like that?

On a more positive note, they all come with full all-round views and fully operational virtual cockpits that are a pleasure to fly. Superb flight models and a high overall quality of aircraft modelling will have you admiring the external views, and this more than compensates for any shortcomings. Features such as the animated pilots who turn in response to the stick, and the accurately designed and correctly animated undercarriages, all add considerably to the realism in a well crafted and reasonably priced package for those who want to experience the cream of airborne military muscle. ■

Joe Lavery

The cockpits – pretty but not fully functional



A-10



F-16

Two different faces of the Fighting Falcon



Review Score



Publisher: Abacus

Price: £19.99

Website: www.abacuspub.com

Developers: Dave Eckert, Tim Taylor and Bruce Thorson

At a glance: If you're a frustrated jet jockey then this is just what you've been waiting for.

System Requirements: PIII 450MHz, 64Mb RAM, 150Mb hard drive space

Recommended: PIII or Athlon 950MHz+, 256Mb RAM, 32Mb 3D graphics card

FS Architect 2002

Flight sim form and function

One of the most appealing aspects of Microsoft's Flight Simulator is its open architecture; from its initial conception this has allowed all sorts of third party developers to expand and improve on the original raw code, providing everything from new aircraft and scenery to completely new environments in which to fly.

Of all the available utilities, scenery design packages have always been hugely popular, because they provide any one of us with the means to have a go at customising our own particular corner of the world.

The latest version of FS Architect was released quite recently by author Douglas A. Pouk and, always keen to embellish our virtual world, we decided to have a look at how difficult it is to use, and how it copes with the improvements that have emerged in FS2002. Obviously the best way to understand the interface, and to reveal the program's limitations (if there are any!) is to use it in anger and customize one of the many bleak airfields within the FS world.

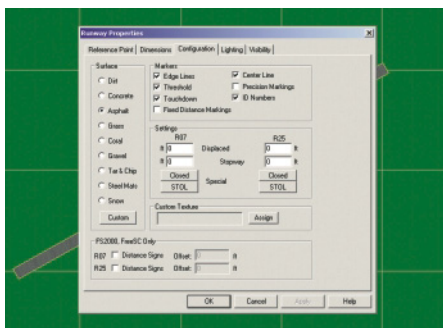
We chose Fife in Glenrothes (Scotland) for our makeover, because it has a single runway and, as you can see from the original screenshot, the default airport is completely barren – an ideal location for our transformation. Naturally, if you're going

to design an airport from scratch, there are a few reference items you'll need, such as a plan view of the area, together with some ground and (if possible) aerial photographs of the building designs and locations. If you have access to these you can use FS Architect's facility for placing photographic data underneath your work area as a reference source.

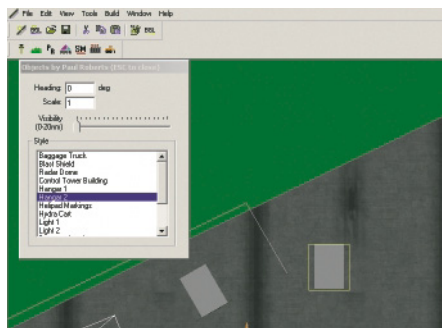
Initially you need to tell the program the location of your new airport, in latitude and longitude co-ordinates, by creating a new file. You can also add a title, the author's name, any comments you wish to store with the file, and the actual file location. The preliminaries dealt with, you can start

adding the various objects that will bring some life into your new airport.

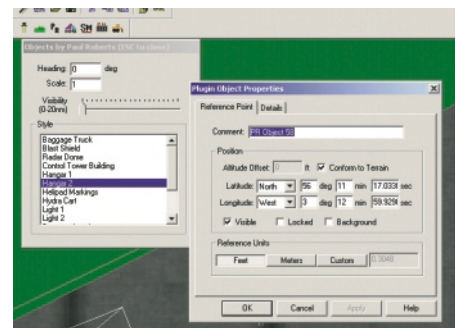
The primary reason for any airfield to exist is obviously its runway, so we started by adding a new runway to the Fife airport using a Jeppesen airfield manual for reference. This tells us that the existing runway is 700 x 18 asphalt, designated 07 and 25, so a single click on the runway icon in the drawing toolbar is enough to launch the runway properties dialogue, where you define everything from the runway heading to the VASI (Visual Approach Slope Indicator) lighting and surface textures. This properties box, incidentally, is very similar to other boxes that appear whenever you create an object, and can be rather daunting



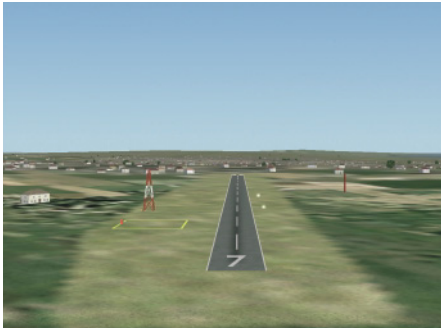
First things first – the new runway



With a few more objects it begins to take shape



The property dialogue is not as complex as it looks!

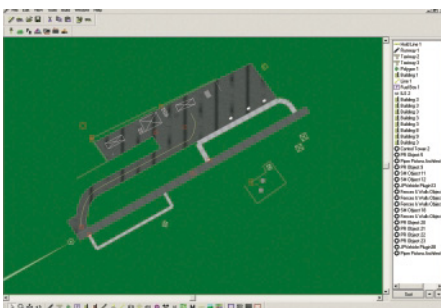


The default Fife... hardly Bonnie Scotland!

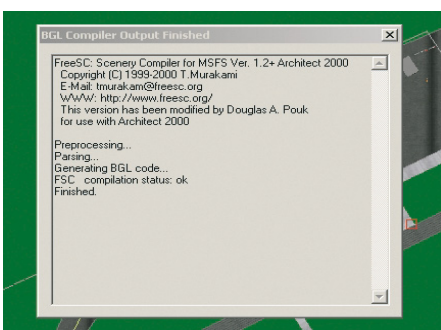
at first; once you get to grips with the formula, however, it's really quite straightforward.

The drawing toolbar we mentioned contains icons for practically every major component you'll need to create your airport, with the exception of small objects such as lamps, vehicles, air bridges and other ancillary items; these have to be created externally and imported via its plug-in facility. You'll be pleased to know that the FS Architect website already has a list of available plug-ins to create all sorts of objects, from such notable scenery authors as Paul Roberts and Shaun Manners.

Because we decided to make Fife look considerably more impressive than its previous incarnation, we made the runway much longer and wider, in order to accommodate the larger aircraft you might expect at an international airport, and then set about constructing a corresponding amount of buildings, taxiways and other objects. This is a fairly quick and easy process, because you simply click to drop each object and then slide it into position. You can always see exactly what you're doing, thanks to the Top Down or 3D views



Move that hanger 4" to the left



Let's see if it works this time...

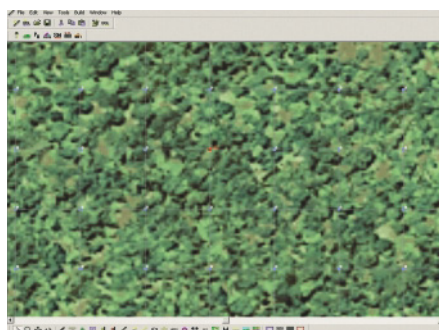


That's more like it!

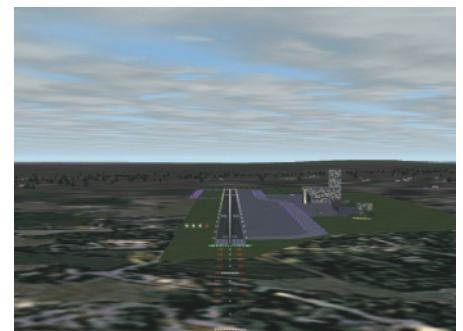
available. It's actually much easier to place objects using the famous 'Mark One Eyeball' than it is by using the more accurate but cumbersome latitude / longitude method adopted by some scenery design programs. After all, we're creating an overall visual impression of our airport, rather than an exact replica.

Having said that, if you really do want that level of accuracy, FS Architect has the facility to make it possible. Should you want the buildings at your airport to resemble the originals, for example, textures for them need to be created using a paint package; you then nominate your own textures in the properties dialogue as you create the buildings. The same process is used, in fact, for applying textures to any object.

The last stage in creating an airport is to generate the source code needed to compile the BGL file that tells the simulator how to display the scenery. It sounds very complicated, but is as simple as two mouse clicks in the Build menu. If you have already nominated the correct directory in the document Properties dialogue, FS2002 will automatically find the file when it's launched. Otherwise you'll need to copy the BGL file and any relevant textures to the add-on scenery folder within FS2002. Although we've treated this as the last stage of the process, it's probably prudent to compile the scenery a few times during the



A few hills – create your own textures



Night textures are included automatically

design stage. It's wise also to save the file with a different file name at various stages, just in case something goes wrong and you need to retrieve your last saved version.

Finally, if you want to widen your scope and have a go at designing some scenery that contains elevated terrain, you're in luck. FS Architect 2002 is apparently the first program to offer real-time mesh editing and, because it's a shareware product, you can try it for yourself before laying out any of that hard-earned cash. Be warned, though – scenery design is not for the faint-hearted and can be an engrossing, time-consuming passion. But you're reading this aren't you? So you're already well down that road already, and what else are computers for anyway? ■

Joe Lavery

Review Score

Publisher: Pouk Software

Price: £27.00 (approx.) including one year's free upgrades

Website: www.pouksim.com

Developer: Douglas A. Pouk

At a glance: Bring FS2002 to life, without needing a degree in architecture, civil engineering, or programming.

System Requirements: PIII 600MHz+, 64Mb RAM, 20Mb hard drive space, Windows 98/ME/2000, OpenGL-compatible graphics card, FS2002

Recommended: PIII or Athlon 950MHz+, 256Mb RAM, 64Mb 3D graphics card

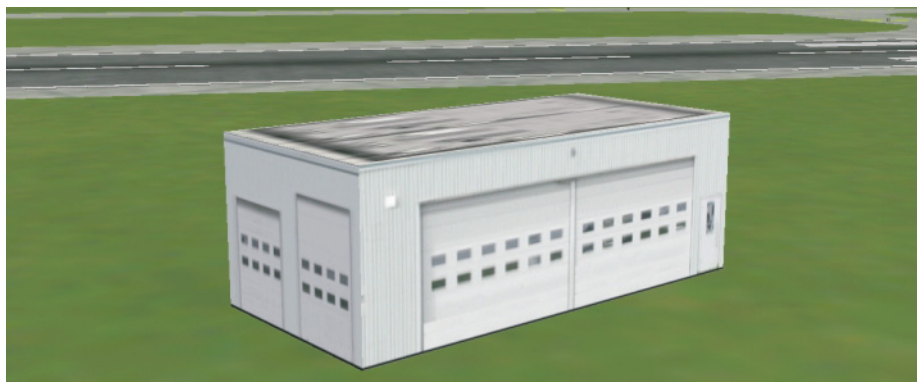
Nova

Building castles in the air

Because the price of processing power has fallen so dramatically over the last few years, we have all come to expect much more of our simulated flights. No longer are we content just to fly over barren featureless terrain, devoid of any surface structures to break the monotony. This explains why the auto-generated scenery introduced in FS2002 has been so well received; it may be somewhat repetitive, but it's far better than what we had before.

Nevertheless, there are still those of you who want even more detail, in which case you have two options. You can either install a few of the commercial or freeware scenery areas already available, or you can have a go at designing your own with a scenery design program such as FSArchitect 2002, which we look at elsewhere in this issue. These will normally create airports or large swathes of landscape, but the objects that inject life into these areas are usually created in a separate program designed specifically for the purpose, such as Rafael Garcia Sanchez's Nova, a shareware product that was originally based on the author's VOD (Visual ObjectDesigner) program.

Nova was first released in March last year, and was then updated recently to support FS2002. It's essentially a design tool for creating practically any type of object or scenery structure you can imagine. It's not intended, however, for creating runways, roads, mountains or mesh scenery, but concentrates more on the architectural elements; combining a variety of primitive shapes allows you to create very complex buildings, bridges or open framework towers. The interface might seem overly complicated at first, particularly when compared to a program such as Abacus's Design Studio but after using it for a while you begin to realise



We wanted a rest room, but not that close to the runway!

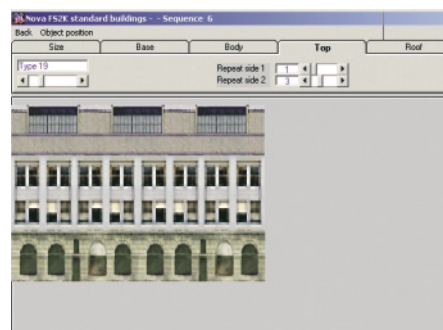
that it's precisely this complexity that provides the accuracy, in both the design elements and the applied textures.

You begin with a simple box or cube (which, after all, is the basic structure for the majority of buildings in the real world) then you define the dimensions (in metres) of the building within the FS environment, and add textures to every face (including the top) from the hundreds available. And that's it, your building is now ready to be compiled into a scenery file ready to use. Of course, there are many other options you can use to create far more complex buildings than the one we've used as an example. You can create buildings with circular or sloped sides, for instance, and also with transparent areas to simulate glass.

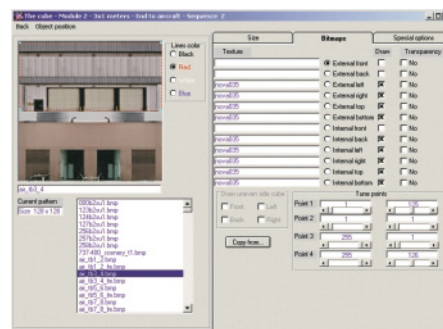
The MSO (Multiple Structure Objects) option allows the creation of structures which have more than one element or different reference points, such as aircraft docking systems, complete with working guidance lights. You can try your hand at hangars with opening animated doors, or towers with rotating radar dishes. The program has the added facility of being able to output Macro files which are compatible with Abacus's Airport Scenery Designer and FSArchitect 2002.

Don't worry if all this appears to be beyond your capabilities, because you can always download the program for the ten-day trial period and see how you get on. There are, in fact, so many predefined objects available on the author's website and many of the other FS sites that you may never have to create your own objects anyway; so go on – it won't cost you anything to take a look!

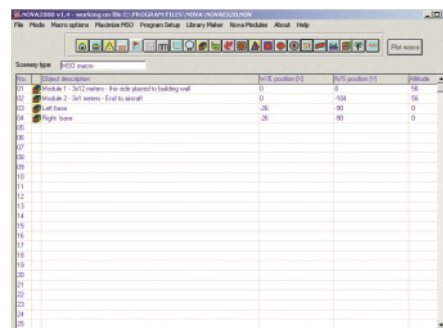
Joe Lavery



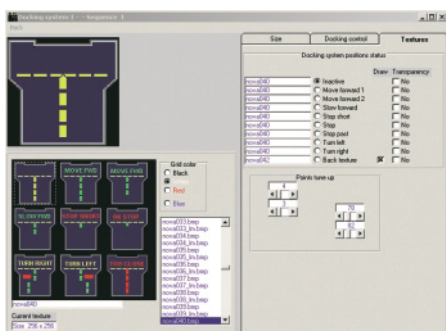
There's a special dialogue for creating FS2002-style buildings



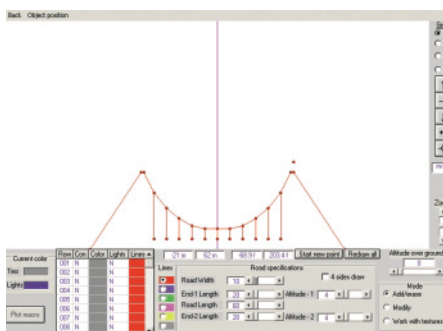
All the fancy wallpaper you need



The main interface – collate the elements of your project here



You want docking facilities? No problem



No, it's not a flying spider – it's a bridge

Review Score

Publisher: Nova

Price: £14.00 approx. for the download

Website: www.fsnova.com

Developer: Rafael Garcia Sanchez

At a glance: There are easier programs to use for scenery design, but none that give you greater control over the design process

System Requirements: PIII 350MHz, 64Mb RAM

Recommended: P4 or Athlon 1000MHz+, 266MHz Bus, 256Mb RAM, 32Mb 3D graphics card

Austrian Airports

Alpine architecture

There's no doubt that much of the pleasure of simulated flying is derived from visiting places that we may never have the opportunity of seeing on our travels, which is probably why accurate renditions of airports and other scenery are so popular. Of course, arriving at a fully rendered and populated airport is also a much more realistic experience than touching down on some of the barren fields dotted with strange grey boxes that Microsoft originally provide for us. To further the cause, FlightXpress have recently released a selection of Austrian airports for FS2000 and FS2002.

All 14 airports and airfields were chosen by the author, Stefan Rausch, because of their particular beauty. We should mention that Stefan's background is in architecture rather than aviation, although his grandfather designed and built the Innsbruck airfield in the 1960s; access to the original plans provided Stefan with a unique opportunity when he set about constructing the simulated version.

Six international airports are included in the package – Vienna, Graz, Klagenfurt, Linz, Salzburg and Innsbruck – which are all rendered to a very high standard, and contain more detail than is usually found in scenery add-ons. The inn at Zell am See, for example, has beautifully modelled tables and chairs on a stone patio, surrounded by a trellis fence.

The GA terminal at Vienna has decorative light standards, advertising hoardings that you can actually read, and a set of gates that are properly scaled.

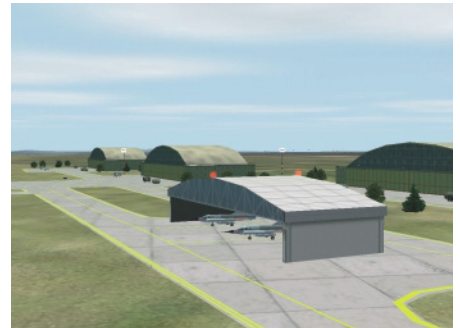
Given the author's special association with Innsbruck, it's not surprising that this airfield is the most realistic of them all. It's difficult to explain exactly what makes this airport so special, but it just looks like it really belongs there. You know how some airfields stand out like a sore thumb... well, Innsbruck doesn't! The author's architectural background is in evidence everywhere, and what we have highlighted here is just a fraction of the detail that you'll find lovingly crafted in this scenery.

All this visual splendour can have an adverse affect on frame rates, but Stefan has constructed his models with great skill, and uses lots of high-quality textures that give the illusion of far more detail than is actually present. This keeps the frame count at a reasonable level, not dropping below 12 even while taxiing at Vienna, the most detailed airport. There's very little in the way of dynamic scenery, although the package does include two proper manuals, which we warmly applaud. The first is simply a synopsis of the package, but the second contains practically every chart, airport schematic, SID and STAR for each of the airports. This runs to over 100 pages with authentic charts supplied by Jeppesen – a superb finishing touch to a very highly recommended package. ■

Joe Lavery



Klagenfurt – the larger airports are equipped with docking gates or ground crew



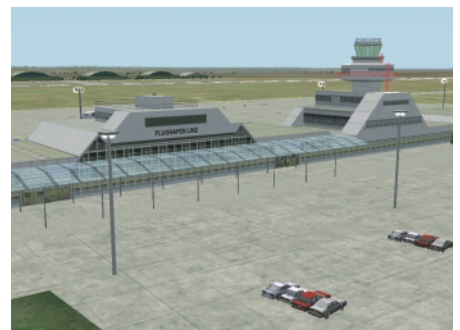
Graz airport also caters for military aircraft



Enjoy a quick lager en route – you can't be found drunk in charge of a computer!



Superb detail around Innsbruck – just look at that Metro Jet gliding into her parking spot



Gorgeous buildings at Linz



Vienna is the largest airport and the most detailed in the collection



Review Score ★★★★★

Publisher: Aerosoft

Price: £29.99

Website: www.flightxpress.de

Developer: Stefan Rausch

At a glance: Undoubtedly one of the best scenery add-ons we've seen so far for FS2002.

System Requirements: PIII 600MHz, 64Mb RAM, 110Mb hard drive space

Recommended: PIII or Athlon 950MHz+, 256Mb RAM, 32Mb 3D graphics card

BAe Bulldog Trainer

Free to a good home

The few of you who are fortunate enough to have flown a BAe (formerly Scottish Aviation) Bulldog will know what a wonderful aircraft it is – light to manoeuvre with almost perfectly balanced controls, sufficiently aerobatic to scare the pants off most passengers, and at the same time supremely stable in cruising flight. Having experienced many blissful hours in the real thing, the opportunity to assess the new Bulldog from PSS (Phoenix Simulation Software) was too good to miss.

Originally available as a £10.00 download from their website, the Bulldog can now be downloaded absolutely free by anyone who signs up as a member on the PSS website – and you don't even have to buy anything!



Normal flying altitude for the Bulldog



Navigation at low levels can be tricky



"I hope these harnesses are tightened properly..."



The Bulldog's colour scheme is based on the RAF University Air Squadron design, and is an accurate representation both inside and out. The virtual aircraft seems to be based on the version previously available as a free download, but it has been significantly upgraded in many ways, one of the most noticeable being the addition of the FS2002 virtual cockpit.

Climb into the Bulldog's cockpit and its military heritage is immediately evident, with the blue-grey instrument panel and the primary flight instruments outlined in a white 'T'. The panel is an excellent copy of the one fitted to the RAF version, although the white markings on the pale blue part of the artificial horizon that show the angle of climb are too faint to see. Nevertheless, a definite nine and a half out of ten for visual authenticity. While looking around and changing views, the aircraft graphics occasionally appear as a grey outline before they are coloured in – something that never happens with the default Microsoft planes.

The engine is running, so we call the tower for taxi clearance. They reply with, "British Aerospace X-ray X-ray 522...", so there's no confusion while listening for our call sign. Completing pre-flight checks at the holding point, including setting the first stage of flaps, we get departure clearance and line up. Full throttle is used for take-off and, holding the runway centreline with the pedals, we rotate at 65 knots, letting the speed build to 80 knots for the climb. The CAA's book figure advises rotating at 45 knots, but if you stay on the ground a bit longer you will be less affected by any crosswind, and your initial climb will be further away from the stall. The virtual engine is limited to 2,500 rpm rather than the actual 2,700, but a quick visit to FSEdit fixed this.

At 200 feet the flaps are retracted, the throttle reduced to 24 inches, the propeller set to 2,400 rpm, and the mixture lever pulled back until the fuel pressure shows 3.7 PSI. Checking the engine instruments allows a short breather before the turn crosswind at 500 feet. In fact we decide to stay at 500 feet for the moment, because that's a good altitude at which to fly this military trainer. For those of you spoilt by years of flying virtual aircraft, there's a shock in store for



The virtual cockpit is just like the real thing...



Actual and simulated rolling performance is very similar

you here – there's no autopilot or GPS to be found. This is not an omission on the part of the developers, but is in fact more akin to real PPL aviation, and is certainly accurate in the case of the Bulldog. This means that you will have to plan any cross-country flights carefully, especially if you're planning to fly them at a low level, because navigation at these low altitudes is never easy.

The aircraft was primarily designed to teach young military pilots to fly, which in their case includes aerobatics. Before trying this, some more sky between the Bulldog and terra firma is required, so with a smooth pull on the stick we first zoom, and then climb to 3,000 feet. The first manoeuvre we try is a simple loop; the recommended technique here is a dive to build speed to 140 knots followed by a 4G pull-up. The loop itself is fine, but the 'overspeed' warning appears at 135 knots, which is well short of the Bulldog's actual 185-knot VNE (never-exceed speed). The roll rate seems about right when tested with an aileron roll and the flight model in the slow roll feels excellent, and requires the proper technique with stick, rudder and aileron to hold altitude and direction.

The stall turn proves difficult, with the rudder losing authority at just the wrong moment, although in a simulator it is easy to misjudge the right point to kick in the rudder. The Bulldog is infamous for its spinning but, as is the case with many virtual aircraft, this feature is not well modelled. This is probably down to FS2002 rather than being a specific characteristic of the Bulldog, but is a pity because the real thing spins so wonderfully. Throughout all of these manoeuvres, your passenger wears a semi-terrified grimace on their face, which is doubtless more realistic than intended.

On returning to the airfield, the plane is easy to land, although the drag from full flaps feels



...but showing less signs of wear and tear



too strong, and requires too much power to hold the descent. Nevertheless, both precision and short-field landings are possible without too much difficulty. As usual you'll need to raise your seat to see the runway unless you are using the virtual cockpit.

The Bulldog is quite a different machine to those modelled in the standard FS2002 fleet; it's a real 'back to basics' plane which isn't excessively demanding and is genuinely fun to fly. It's a little too unstable in pitch in the climb, although this may be caused by the lack of detail on the artificial horizon when you can't see the ground over the nose, and is something that you learn to control. Naturally there are differences between the PSS Bulldog and the genuine article, and the main points have already been mentioned, but these certainly shouldn't detract from the enjoyment of flying this plane. It's a worthy addition to your fleet, and one which should appeal especially to those who want to hone their seat-of-the-pants stick and rudder flying skills. The Bulldog was great value at a tenner. Now that it's free, it really is too good to miss!

Stephen Heyworth



The author with his favourite pet

Review Score

Publisher: Phoenix Simulation Software

Price: Free download


Website: www.phoenix-simulation.co.uk

Developer: Phoenix Simulation Software

At a glance: A good rendition of one of the best military primary trainers around. A few minor glitches, but still great fun to fly.

System Requirements: FS2002, otherwise not specified

Recommended: PIII 700MHz+, 128Mb RAM, 3D graphics card



Holding Patterns

*Stacks of information
about flying accurate holds*

Your radio crackles and the air traffic controller says, "Golf Bravo Sierra Mike Hotel, hold at Bravo India Alpha flight level one five zero, inbound track zero seven nine, turns left, outbound time two minutes, expect further clearance at zero six one seven". This is the standard order in which you would receive the details of a holding procedure. The acronym to remember is FLIRT: Fix (which is the place to hold), Level to be flown, Inbound track, Right or left turns, and Times of outbound leg and EFC (Expect Further Clearance). In this ATC instruction you are given everything you need to fly the hold, but the instruction could have been the much briefer "Golf Bravo Sierra Mike Hotel, hold at Bravo India Alpha flight level one five zero, expect further clearance at 0617".

This latter instruction assumes that you know what to do in a standard hold. With flight simulation becoming ever more realistic month by month, it won't be too long before you start hearing these holding instructions from ATC. You are already likely to hear them from Internet-based ATC providers such as VATSIM, so spend some time practising the techniques given here

and you'll know exactly what to do when that radio call comes.

Holds are used by ATC to keep aircraft a safe distance apart on the world's congested airways and to provide the necessary spacing between aircraft landing at busy airports. You'll also encounter them on some instrument approach plates, in particular for missed approach procedures; as an example, the missed approach for Donegal includes climbing to a hold at the NDB at 3,600 feet. Holds are always flown on instruments. They are an IFR procedure that forms part of the Instrument Rating and are one of the elements that can cause the most difficulty during the test. Holds should not be confused with instructions to orbit given when flying VFR. Orbiting is simply flying round in circles over a specified position; there are usually few constraints given to an orbiting pilot – "Your clearance limit is the south bank of the river", for example – and hence it's not at all complicated.

We'll start by flying a standard holding pattern in a light aircraft in calm conditions, and then move on to consider the many

variations and complications that you might have to manage as a pilot. It is advisable to become competent holding in smaller aeroplanes on a calm day before you progress towards descending in the pattern at the controls of a Jumbo at night, in strong winds, with turbulence and icing.

The basic holding pattern

The basic holding pattern is a track made up of four sections, each taking one minute to complete. There are two 180-degree turns and two straight legs, so it should take exactly four minutes to fly one complete pattern. The hold begins and ends at a given position called the 'holding fix', which is usually a beacon or an airway waypoint. The standard hold is a right hand one, which means that all turns are to the right. A holding pattern also has a holding direction or 'course', which defines the route that must be flown up to the holding fix in each hold.

Everything in flying is affected by wind, and holding patterns are no exception. The effects of wind will be handled later, but it's important to realise that the hold is defined by a holding course and not a holding

Speed (Knots)	Bank Angle for Rate One turn (Degrees)	Time for 25-degree turn (Seconds)
80	12	28
90	14	32
100	15	35
110	17	39
120	18	42
130	20	46
140	21	49
150	22	53
160	24	56
170	25	60
180	26	63
190	27	67
200	29	70
210	30	74
220	31	77
230	32	81
240	33	84
250	34	88
260	35	92
270	36	95
280	37	99

Table 1. Holding Turns. The 25-degree rule applies above 170 knots. For the mathematicians, the relationship (in consistent units) is: $Velocity \times (Angular Velocity) = G \times Tan (Roll)$

heading. This means that the approach to the holding fix is along a given track over the ground, and the heading flown must be altered to accommodate any wind correction. The basic holding pattern is shown in Figure 1.

The sequence of events for a hold begins when you cross the holding fix as you are flying along the holding course. At this point you must do two things: start your stopwatch and immediately turn right. The turn must be a 'rate one turn', which is defined as a turn that takes two minutes to make a complete circle and end up on your original heading. Consequently your first turn through half a circle should take precisely one minute. The first turn is complete when you are heading in exactly the opposite direction to your holding fix. This direction is flown along the outbound leg for one minute before starting a second right hand turn. Again the turn must be rate one, which will leave you on your holding course three minutes after you started the hold procedure. You now have one minute of inbound leg to fly along the holding course, which will take you back over the holding fix exactly four minutes. This should all be flown whilst accurately holding your given altitude, because there may be other planes holding the same pattern either 1,000 feet above or below you in the stack.

Most light aircraft have either a turn indicator or a turn co-ordinator. The former is a simple needle and the latter usually looks like the outline of a plane viewed from the back. Both of these will have a mark that indicates when the plane is flying a rate one turn. Many turn co-ordinators even have '2 minutes' on the face of the dial. Either instrument makes it simple to roll into and then maintain a rate one turn. If your particular plane is not equipped with such an instrument, the appropriate bank angle is given in Table 1.

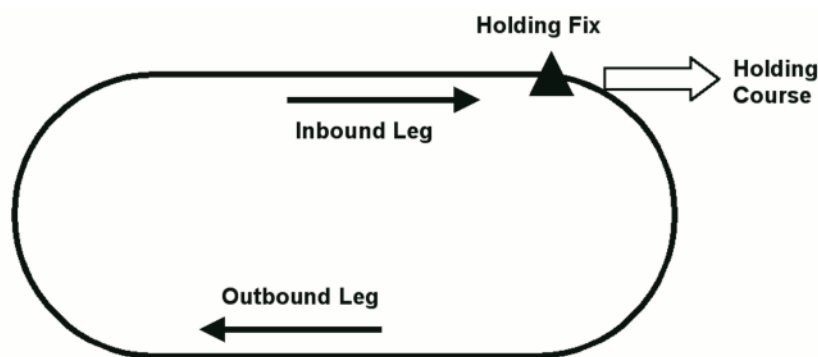


Figure 1. The standard holding pattern

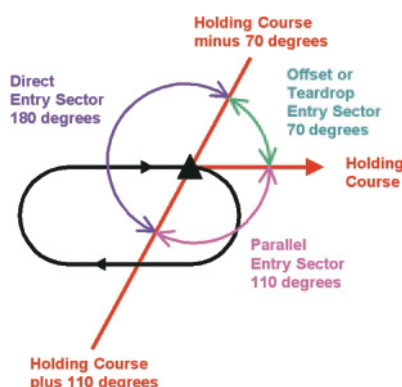


Figure 2. Entry sectors for the holding pattern

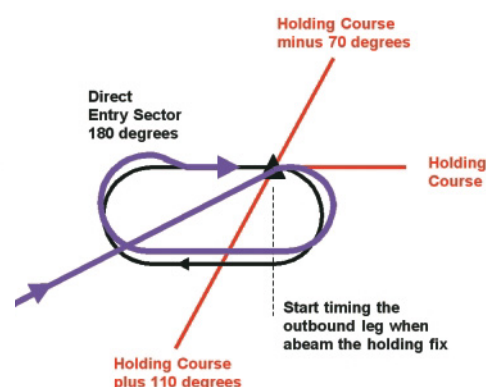


Figure 3. Direct Entry

Holding Course	Direct Entry Headings	Offset Entry Headings	Parallel Entry Headings
360	290 to 110	110 to 180	180 to 290
270	200 to 020	020 to 090	090 to 200
225	155 to 335	335 to 045	045 to 155
130	060 to 240	240 to 310	310 to 060
090	020 to 200	200 to 270	270 to 020

Table 2. Entry headings onto a hold

Entering the hold

In some cases you will arrive at the hold along the holding course. This means that you can fly directly to the holding fix and then turn immediately into the first pattern. Unless you are on an airway, however, you are just as likely to arrive at the holding fix from some other direction, and there are standard procedures you must follow to become properly established in the hold. There are three types of 'entry' into the hold – Direct, Parallel, and Offset / Teardrop. The particular entry you fly depends on which entry sector you arrive in. Study Figure 2 while reading this explanation, because a graphical presentation makes it far easier to understand.

The **Direct Entry** is used for any aircraft arriving on a heading that is between minus 70 degrees and plus 110 degrees of the holding course.

The **Offset Entry**, also called the **Teardrop Entry**, is used when your flight heading is between plus 110 degrees and plus 180 degrees of the holding course.

The **Parallel Entry** is used when your heading is between plus 180 degrees and minus 70 degrees of the holding course.

It is often easiest to work out which entry to use by drawing a small sketch similar to Figure 2, but orientated to match the particular hold, then drawing on the sectors, and finally drawing your flight path up to the hold. Table 2 gives a few examples.

Direct Entry

The **Direct Entry** is both the most common and the easiest; simply fly directly to the holding fix and start to fly the holding pattern. Strictly speaking, you should start your timing for the outbound leg when you are abeam the holding point, but this is not

normally too critical. The initial hold will be a distorted track and will probably not take exactly four minutes, but this doesn't matter. The key is that, at the end of this first hold, you should arrive over the hold along the holding course. See Figure 3.

Parallel Entry

When flying the Parallel Entry, you should cross the holding fix, then immediately start your stopwatch and turn onto the outbound heading. You will be flying close to and parallel to the inbound leg (but in the opposite direction), which is how this entry derives its name. After one minute, turn left through 225 degrees to intercept the inbound leg at 45 degrees before crossing the holding fix. See Figure 4.

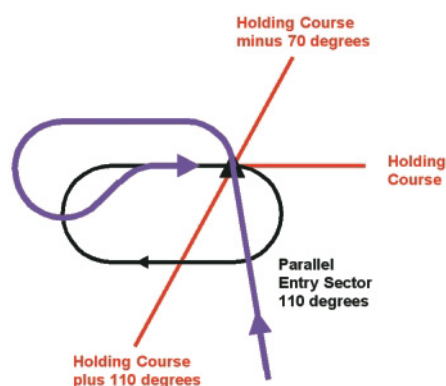


Figure 4. Parallel Entry

Offset or Teardrop Entry

The Offset or Teardrop Entry starts by flying over the holding fix and then turning onto a heading 30 degrees to the left of the inbound leg. You can calculate this in a number of ways, but the easiest is probably to calculate the outbound leg course, which you will need to know anyway, and then subtract 30 degrees. So if your holding course is 330, your outbound leg will be 150 (the opposite direction) and therefore

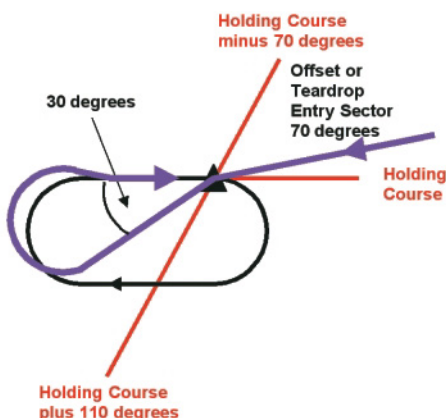


Figure 5. Offset or Teardrop Entry

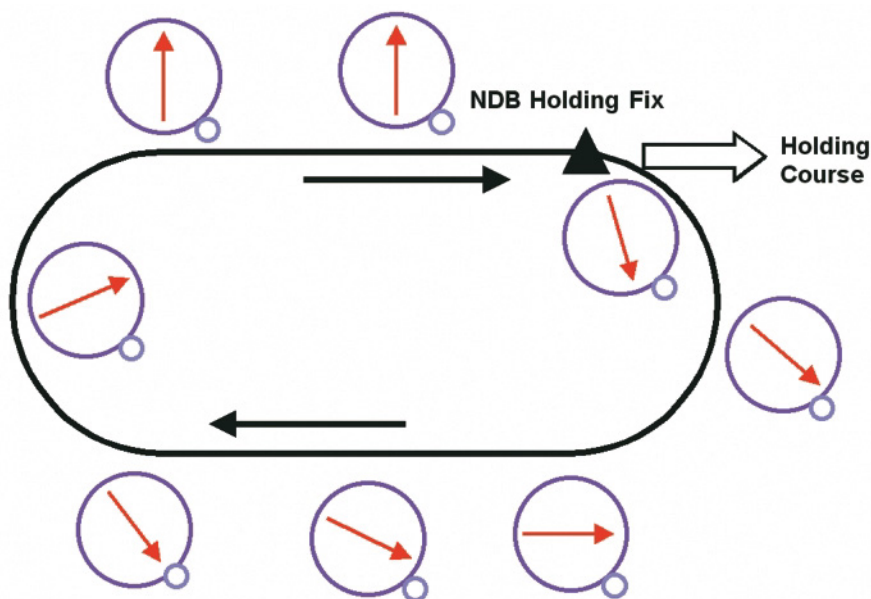


Figure 6. NDB indications around the hold

your Teardrop Entry heading will be 120. After one minute, turn right and intercept the inbound track. See Figure 5.

Flying a few holds

Now is the time to fly some holds. Choose a small aircraft such as a Cessna 182 and settle down in the cruise at, say, 3,000 feet and 120 knots. Once you are in the cruise, you can leave the throttle where it is throughout the hold and your speed should not vary significantly. Select a nearby NDB and fly towards it. Pick a holding course, starting with something easy like North. Determine which entry sector you are in and think through everything that you are about to do. Fly the entry procedure followed by about a dozen holds. If you have difficulty, study the NDB indications you would expect to see around the hold in Figure 6. By far the most important aspect of flying these basic holds, however, is to fly accurately. There is a lot to do in four minutes, so be careful not to

concentrate on one aspect (such as heading) and forget to check the others (such as altitude and stopwatch).

Once you have mastered this, there are several variations to try. The simplest is to try a left hand hold instead of the right hand one; not only is the direction of holding changed, but the entry sectors are swapped from left to right too. Next try holding at a VOR. Set the VOR's OBS bezel to the holding course; this makes intercepting the holding course easier, but gives less indication of your position around the hold. The next step in complexity is to hold at a DME along a radial from a VOR. This is no different from holding at a VOR, except that you have to turn when the DME shows a particular distance rather than when the TO indication changes to FROM.

The most difficult feature of these basic holds is climbing or descending in the pattern. Make your change of height at 500 feet per minute, which is the required minimum for IFR flight. For this exercise,

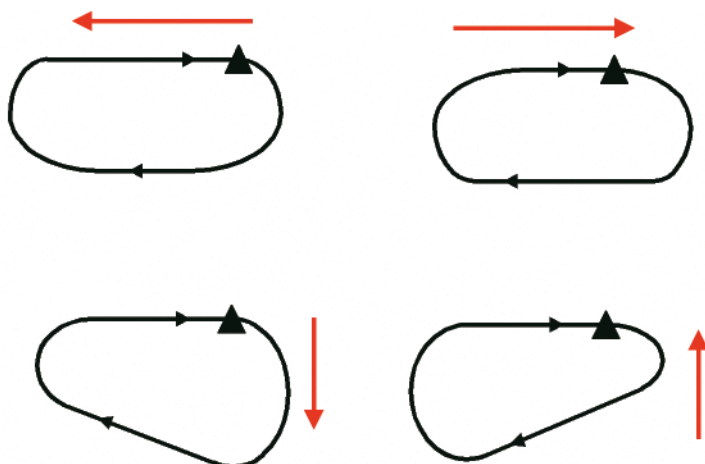


Figure 7. Compensating for wind in the hold. The wind direction is shown in red and the distortion is exaggerated!

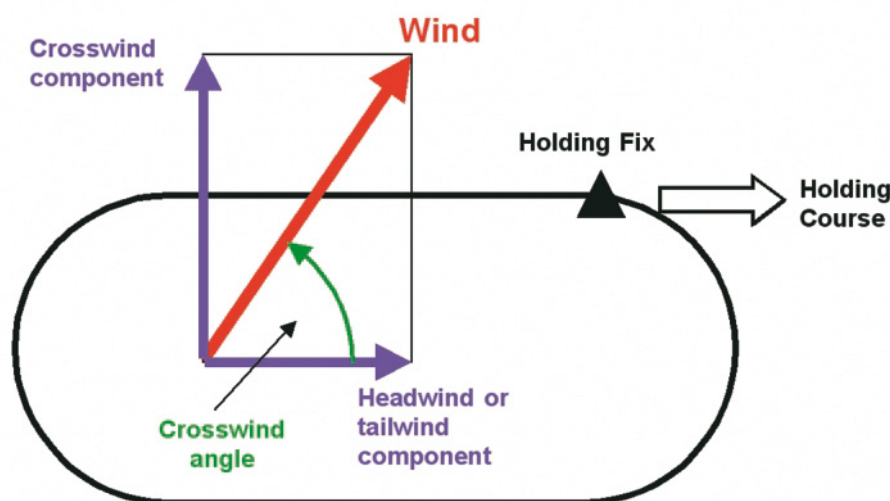


Figure 8. Splitting the wind into components

start your hold at 8,000 feet and at any point in the pattern descend to 2,000 feet and level off. While you are doing this you must stay in the hold, control your speed, and maintain 500 feet per minute.

Adding wind

So far you've had it easy, because you have been flying all your holds in still air. In the UK this rarely happens and, the higher you go, the stronger the winds usually are. If you were to fly a pattern on a windy day without making any corrections for the consequent drift, you would be blown away from the holding fix and your timings would be nowhere near the required four minutes.

Fortunately it is accepted that the shape of a hold in windy conditions cannot be a perfect track. Nevertheless, you must keep to the overall time for the hold and the track of the inbound leg. You still need to fly two rate one turns and two straight legs. The wind is constantly blowing you in one

direction, so the diameter of your two rate one turns will be different; they will not even have constant radii. Similarly, your inbound and outbound legs are likely to be different lengths too. Look at Figure 7 to see how you would have to compensate for wind from the four points of the compass. When there is a headwind or a tailwind in the inbound and outbound legs, their times must be altered to ensure that the holding pattern still only takes four minutes. When the wind is from the side, the outbound leg must be angled to enable the inbound leg to be flown along the correct track.

The wind will almost always be from some other angle and not from just the front, back or side, hence it will contain a crosswind component and a headwind or tailwind component. See Figure 8. Before you enter the hold, you will have to estimate the corrections that you are going to make. This can be calculated extremely accurately but, as you are unlikely to know the exact wind

conditions, a good estimate will suffice to begin with.

Take your best estimate of the wind and calculate the angle between that and your holding course. Next work out the crosswind component of the wind; this is the wind speed times the Sine of the angle, but nobody does this. Many flight manuals contain crosswind tables but the easiest way, which is accurate enough, is to use the clock face technique. On a clock we regularly think of 15 as quarter (past), 30 as half (past) and 45 as three quarters. You can apply the same to crosswinds. A crosswind angle of 15 degrees gives a quarter of the wind as crosswind and so on until you reach 60, when all the wind is considered as crosswind. Table 3 shows how this would work for a 20-knot wind.

The same approach can be taken to find the head- or tailwind. See Table 4. This time calculate the headwind or tailwind angle, which is always 90 degrees minus the crosswind angle, and then calculate the headwind or tailwind in the same way, using 20 knots again. The angle is unlikely to be exactly 0, 15, 30, etc. degrees, so again you can either interpolate or simply select the nearest one.

Next look at the wind direction and assess whether the wind will have a headwind or a tailwind component on the inbound leg. If it's a headwind, you should increase the time on the inbound leg by one second for every one knot of headwind and similarly decrease the outbound leg by one second. If the wind is a tailwind you do the opposite, decreasing the inbound leg by one second per knot of tailwind, and increasing the outbound leg by one second. Notice that the overall time of the hold remains at four minutes.

Now consider the crosswind. You will probably be flying your hold at about 120 knots, so take the crosswind component and divide it by two; this is your allowance for drift on the inbound leg to keep you on track. You cannot adjust your standard rate one turn for crosswind, therefore you must compensate for the turns during the outbound leg. The outbound leg is also subject to the crosswind, which means that it has to compensate for three minutes worth of flying. Compare this to the allowance on the inbound leg, which compensates for only one minute of flying – it's different by a factor of three. Therefore the compensation on the outbound leg must be three times that used for the inbound leg, which you have just worked out. Again, common sense is used to determine whether the drift must be applied from the left or from the right.

This will all become clear with an example: Consider a holding pattern with a holding course of 045 and a 20-knot wind from 350. The crosswind angle is 55 degrees from the left and the headwind angle is 90 minus 55, which is 35 degrees. The crosswind proportion is 100% because 55 is almost

Crosswind Angle	Proportion	Crosswind
0	Zero	0
15	Quarter	5
30	Half	10
45	Three Quarters	15
60	All	20
90	All	20

Table 3. Calculating the crosswind component of a 20-knot wind

Head or Tailwind Angle	Proportion	Head or Tailwind
0	Zero	0
15	Quarter	5
30	Half	10
45	Three Quarters	15
60	All	20
90	All	20

Table 4. Calculating the headwind or tailwind component of a 20-knot wind

60, which the clock face (or table) gives as 'All'. The crosswind component is therefore 20 knots, and we allow half of this, 10 degrees, to compensate for drift. Similarly the headwind angle of 35 is close to 30, which corresponds to half, giving a head or tailwind of 10 knots. Looking at any compass rose (and there are plenty on the aircraft instrument panel), you can see that the crosswind is from the left and that the other component is a headwind. Therefore, applying our rules, the initial plan for the hold is:

- Inbound heading 035 – which is 10 degrees left of 045 (into wind)
- Outbound heading 255 – which is 3 x 10 degrees right of 225 (into wind)
- Inbound leg 70 seconds – which is 10 seconds added (against the wind)
- Outbound leg 50 seconds – which is 10 seconds subtracted (with the wind)

Once you have completed your first hold, you should have learnt two things – the overall time that it took, and the heading you had to fly to stay on the inbound track. You should now use this information to make your second hold perfect. First of all, if your hold took longer than four minutes, take half the amount of error and decrease the outbound leg and increase the inbound leg by this amount. For example, if you planned your outbound leg as 55 seconds and your inbound leg as 65 seconds, but it took you 4 minutes 20 seconds to complete a hold, you would change these timings to be 45 seconds outbound and 75 seconds inbound. This works because the turns always add up to two minutes (you cannot change them), and the two straights must add up to two minutes, so to get back to the holding fix 20 seconds earlier, you must shorten your planned outbound leg by 10 seconds and increase your planned inbound leg by exactly the same amount. If the hold takes less than four minutes, you would do the opposite, which is to increase the outbound leg and decrease the inbound leg. It is exactly the same logic, but applied in order to prevent you arriving back at the fix too soon.

If you were able to fly accurately along the inbound leg, maintaining the correct track over the ground, you will know the heading you had to fly; the difference between this and the holding course will be your drift. Using the logic already discussed, you know that the compensation you will have to make to the outbound leg heading is three times the allowance for drift on the inbound leg. If you are able to assess this during your entry into the hold, which is possible in many circumstances, you may have your inbound and outbound headings cracked before you even start the hold.

On your subsequent trips around the pattern make small correcting adjustments each time, depending on the errors you find. Remember that the wind can change while you are holding, so once you have sorted

out your headings and times, don't be surprised if you need to change them if you are required to hold for any length of time. Finally, remember that the entry to the hold is also affected by the wind, so make similar adjustments there too.

Even more sophistication

So far you have been flying round the pattern in a light aircraft and at a relatively low altitude. When you need to fly higher and faster, the rules change and you will have to alter the hold slightly. If you fly above 14,000 feet, the holding pattern has to take five minutes, comprising two rate one turns and two 90-second legs. This makes a few subtle changes to your pattern. Your outbound leg now has to compensate for three and a half minutes of wind in one and a half minutes of flight. This is closer to a ratio of two than the ratio of three used in the four-minute hold. You should therefore make the wind compensation in the outbound leg twice that used for the inbound leg.

The speed of modern jets means that they need quite a steep bank to achieve the rate one turn. To avoid excessive roll, the bank angle in the holding turn is limited to 25 degrees. This prevents your passengers from experiencing too much g-force and keeps the wing loading down. Unfortunately, the result is that the turn takes longer and takes up more sky. For the 25-degree limited turns, you should start your timing at the start of the outbound leg, when you are abeam the holding fix. If you cannot work out where this is (for example on an airway) you should start your timing when you have completed your turn away from the holding fix. The leg lengths should still be flown for the appropriate times, compensated for the wind as before. A further subtlety is that if you are flying holds using a Flight Management Computer, it may plan the pattern based on 25-degree turns, but then fly the planned track precisely using turns of up to 30 degrees.

There are maximum speeds that you must not exceed in the hold. If you are flying a propeller-driven aircraft, you should keep at or below 175 knots. If you are flying a jet-powered civil aircraft, you will need to keep below 0.83 Mach.

This is reduced, however, to 265 knots at or below 34,000 feet, 240 knots at or below 20,000 feet, and 230 knots at or below 14,000 feet. This all seems straightforward, but you must be certain that slowing to these speeds will not result in a stall, especially when turning a heavily laden aircraft. In this case you would ask ATC for a higher speed. These figures are increased for turbulent conditions, when 280 knots is permitted. You should also be aware that these ICAO speed limits do not apply when under FAA rules, where they are 200 knots up to 6,000 feet, then 230 knots to 14,000 feet and 265 knots above this.

As a final complexity, holds can be defined in many other ways, such as by DME or VOR radials. In these cases you will have to carefully study the charts and fly them as stated.

If you really want to test your skill as a pilot, try flying all of these holds in a twin-engined plane on 'limited panel'. Limited panel, when used for flying test examinations, means an inoperative attitude indicator/artificial horizon and an inoperative direction indicator. This may sound like hard work, but is the standard that an Instrument Rated pilot would be able to handle.

Leaving the hold

The normal way to leave the hold is to fly over the holding fix and then continue with the planned route; this should cause no difficulty at all. If you can handle the hold, reverting to the onward flight will be easy by comparison. There is, however, one circumstance that does require some additional skill; you may be given a specific time to leave the hold that does not correspond to a time you expect to cross the holding fix, such as three minutes after you cross the fix.

The rules governing this are that you should adjust your flight path, within the boundary of your current holding flight path, in such a way that you will be able to leave the hold at the holding fix at the allotted time. This essentially means that you must shorten the straight legs by the appropriate amount. As an example, if you are in a five-minute holding pattern and are told to leave the hold three minutes after you next cross the holding fix, you should shorten each leg by one minute, thereby knocking two minutes off the total hold time.

Holding patterns are an integral part of instrument flying, and to be a proficient instrument pilot you must be totally competent flying them. They are a common element of many approach procedures, which would normally be used only when the airport is busy, when the weather is improving but still below limits, or following a missed approach.

You can see examples of holding patterns in the many charts provided in previous issues. Next time you are flying an approach, check the chart for the associated holding pattern. Look for holds if you are flying an arrival, or along an airway. If you approach an airport too high, try descending in the associated pattern. As with all elements of flying, what once seemed an impossible task will, with enough practice, become almost second nature. Because accurate flying of a hold involves using so many flying skills in a short space of time, they are a particularly good test of your ability. Having perfected the art of the hold, perhaps now is the time to show off and fly that pattern in the Jumbo – at night, in strong winds, with turbulence and icing! ■

Stephen Heyworth

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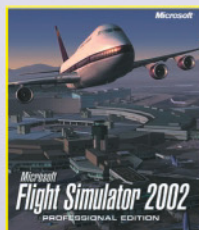
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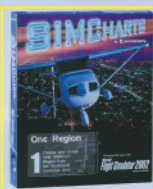
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Flying and Fighting in IL-2 Sturmovik

Return to the Eastern Front



IL-2 Sturmovik has genuinely redefined the WWII combat simulation genre, and its attention to detail is staggering; all aspects of the package, notably the flight models, physics, and damage modelling, are excellent. With this increase in realism, however, comes a corresponding increase in the challenge, but fortunately IL-2 can be customised to allow you to fly at the level you prefer.



You can paint your own aircraft, build your own missions, and for the online pilot options abound, with pilots gathering at Ubi Soft as well as at the HyperLobby. We'll detail some of the ways in which you can maximise your flight experience and make IL-2 truly your own.

Configuration and setup

Firstly, a few straightforward tweaks should enhance the performance of this fine simulation. Ensure that you have the latest drivers by visiting the manufacturer's website for your particular hardware. Download and install any updates for sound and video by following the instructions provided; the most serious problems in IL-2 are the result of using outdated drivers.

The next step is to configure your controllers. If you don't already have a HOTAS (Hands-On Throttle And Stick), consider acquiring one; a separate stick, throttle and rudder pedals will give you the highest degree of control. CH Products, ThrustMaster, and Saitek all produce hardware of excellent quality, and the best (and most expensive!) of these is probably the ThrustMaster Cougar. Force Feedback fans have a broader choice, but only in single stick solutions. Once your controllers are installed and recognised in Windows, and once you have them programmed to your liking, you may need to adjust the response curve. This is particularly true for lighter hardware, where weak spring tension can result in overcontrol.



In combat control is everything

From IL-2's main screen, click on **HARDWARE** and then **INPUT**. You can now adjust the Dead Band as well as the response curve along each axis. If you have a joystick, throttle and rudder pedals, you will have five axes. If you have a single stick solution such as Microsoft's Sidewinder Force you'll have the same axes, but the response curve will be different. Adjust the curve until the IL-2 aircraft perform to your liking. We'd recommend making your adjustments with a relatively stable aircraft – the Bf-109G-2 is ideal.

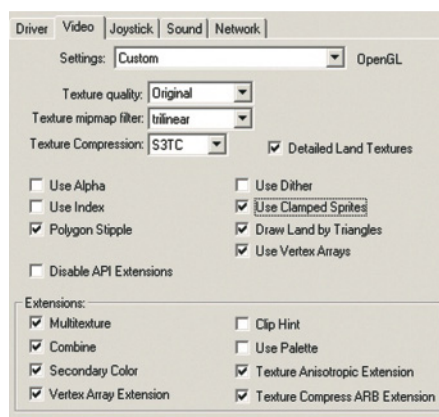
Once the controllers have been configured, examine the video and sound setup. You want a configuration that will combine stability in the simulation with a reasonable



Bf-109G-6 among the hills

frame rate during combat. IL-2 prefers hardware T&L support, so if you happen to own an ATI Radeon 8500 or a GeForce2 board, you're bound to be happy with their performance. Hardware can be selected in the IL-2 Setup program, and then you can customise individual settings. We chose S3TC texture compression for better detail when low, and turning on Stencil Buffer should show an improvement in the appearance of shadows.

Finding the optimum sound settings is trickier, particularly for owners of older hardware. The most common problem is with the hardware voice manager, so disable it if you experience odd stuttering or any loss of sounds. The 3D engine mode can also be reduced if you have trouble. If you prefer not to have your screen fill up with text, you can edit the Conf.ini file found in IL-2's root directory; open the file with a text editor and find the 'Game' section. The 'NoSubTitles' line should be changed to =1, and ensure that the capital letters are exactly as shown here.

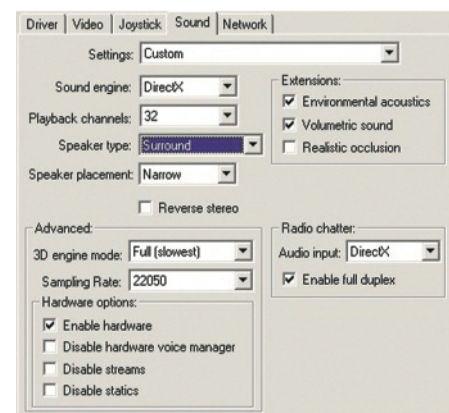


If you're not sure...experiment!

Flying and fighting

Pilots should obviously learn to fly before engaging in combat, since you'll be pointing your entire aircraft at the enemy to score a kill. First learn to use your flaps, and practise loops and turns one-on-one against AI enemies. Notice how a notch of flaps can increase your turn rate or pop your aircraft over the top of a loop. Practise different techniques – try the FW-190 as a boom 'n' zoom fighter, or perhaps the La-5 or Yak-1B as an angles fighter.

Learn to manage your energy. The most common error made by novices is excessive closure speed, which will result in finding the bandit on your tail. Manage your energy when you pass a bandit at high speed by converting energy to altitude. Fly using the internal padlock as well as the external padlock views. Novices should fly with the icons enabled, but don't be afraid to try simple engagements with them off; your eventual goal should be to fly without their assistance.



IL-2 sounds great – so get the best out of it



Brrrrr! FW-190 flees a Pe-3 in the Russian winter

Stick with one, or at the most two, aircraft as you learn to fly, and learn the strengths of your own aircraft as you exploit the weaknesses of others. Rather than starting with a difficult aircraft like the FW-190, try the Bf-109G-2 or the La-5FN; these both have decent hitting power and are very forgiving, but of the two the La-5FN will take much more damage. The Yak's instability doesn't recommend it to beginners.

When you first fight online grab some altitude and be slow to enter the fray. Try to isolate a single aircraft and then attempt a firing pass. Note the reactions of an aircraft to this first pass to distinguish the novice from the experienced pilot; the panic reaction is easy to spot! A great way to learn online fighting is to fly with a more experienced buddy. Fly as a wingman, maintain your distance from the leader, and follow him as he fights. Then let him sit on the sidelines and watch as you engage, so that he can offer suggestions later.

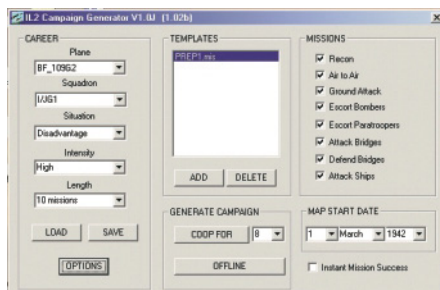
Custom missions

When you tire of the missions provided in IL-2, you can build your own, download those that others have designed, or fly online for a continually changing experience. The official website at www.il2sturmovik.com offers missions for download, but if you can't find the perfect mission there are three options for creating your own. The first two are built into IL-2; the Quick Mission Builder is easy to use and allows you to set up a variety of engagements, while the Full Mission Builder takes longer to master but allows you to create single missions, online missions and campaigns.

The third option is to download Starshoy's Campaign Generator. This powerful shareware utility will allow you to generate a whole series of missions based on your own choice of parameters, and it even allows you to generate co-operative mission sets!

The Full Mission Builder

While mission generators have much to offer, they can't provide the strategic and tactical complexity of hand-scripted missions. It's for this very reason that Just Flight have recently released Eastern Thunder, a complete add-on campaign for IL-2. This includes detailed reconnaissance



The Campaign Generator – What do you want to attack today?

photos and maps, as well as full mission briefings for both sides, and the missions are flyable online or in single-player campaign mode.

IL-2's Full Mission Builder is a great deal of fun to use. You begin by choosing a map, and then design your scenario and add aircraft and objects. Finally you place targets and mission goals, and can then spend hours testing your creation! It's possible to build historically accurate scenarios, even to the extent of assigning the proper squadrons to a given battle, or you can put together 'what if' missions that allow you to test unusual matches. How about pitting VVS jets against German bombers, by assigning Luftwaffe jets to VVS squadrons? You can even substitute the Pe-2 for the Me-110 by giving it German markings.

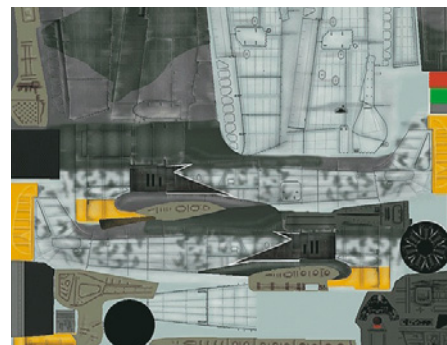
The Builder is used in 2D mode, but high levels of zoom allow you to work in 3D. This allows the placement of objects with a high degree of accuracy, which is very useful for hiding armour among trees and buildings. It's possible to assign delayed starts in offline missions, so that aircraft can take off at various points during the mission. Co-operative

missions, on the other hand, can involve great numbers of AI aircraft and objects while the human pilots fight for dominance in an expansive battle environment.

One of the few shortcomings of IL-2 is that it doesn't allow more than one page of briefing information, and provides no images other than the included area map; this restriction doesn't limit players, however, from building briefings external to the program. Taking screenshots within the Mission Builder lets you generate maps such the one pictured, which can be accessed outside the simulation prior to flying the mission.

Custom skins

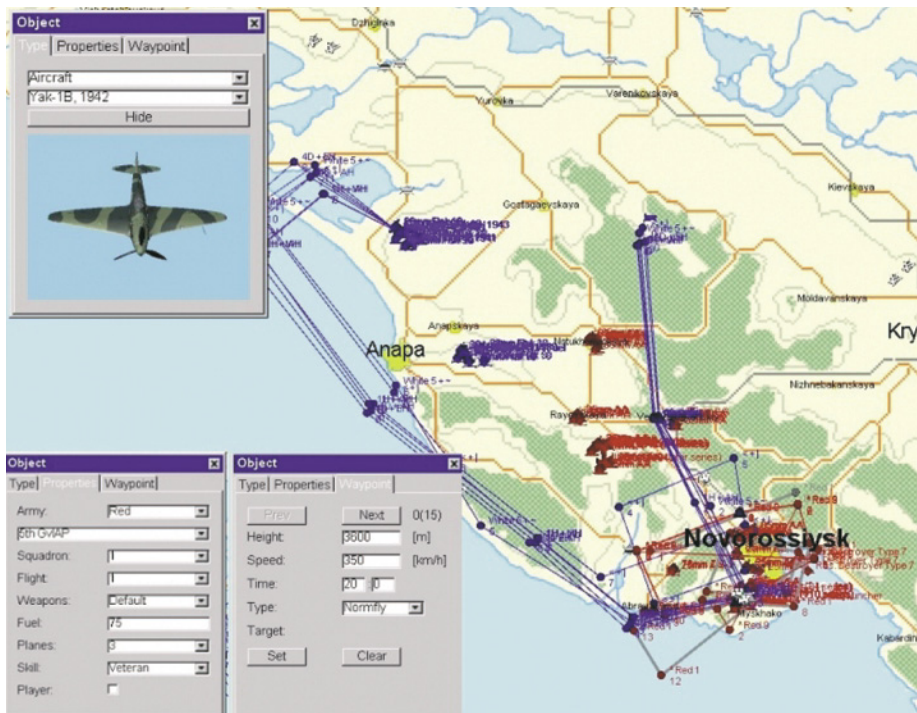
It's possible to create your own paint scheme for any flyable aircraft in IL-2, and hundreds of players have already created many new skins. Aces such as Adolf Galland and 'Pips' Priller had their own preference for camouflage and markings, and Photoshop devotees have already been busy recreating these historical aircraft. Try www.algonet.se/~hjortsb/il2/index.html and www.jagdgeschwader54.net for some excellent skins to download.



Custom skin courtesy of Walter Nowotny



Learn to fly, then to fight, and this should be easy

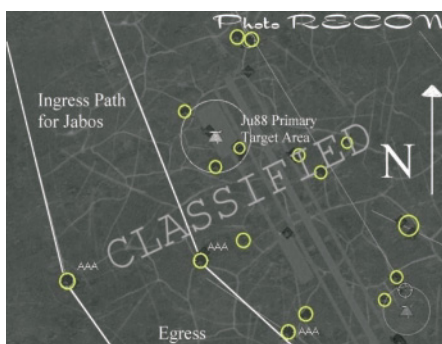


Plenty of choice in the Full Mission Builder

If you want to paint your own, a good template and a working knowledge of Paint Shop Pro or a similar program will be required. The files are 512 x 512 in size and are saved as 256-colour bitmap files. Blank templates are available to download from the IL-2 website – just go to Game Elements and click on Paint Schemes. Alternatively, you can download your favourite skin and simply modify it to your own taste. Adding lettering or special markings is simple work compared to painting a skin from a blank template. Some highly unique colour schemes can be found online, so don't be surprised if you encounter a Bf-109 adorned with an American flag!

Utilities and multiplayer lobbies

By far the most useful utility for the online player is Jiri Fojtasek's HyperLobby, which currently supports IL-2, Jane's WWII Fighters, USAF, FA-18 and more. Available from <http://hyperfighter.jinak.cz>, this is a free download of less than 1Mb and allows you to meet with other online players, select a preferred style of combat, and join in an almighty online battle. The chat bar allows



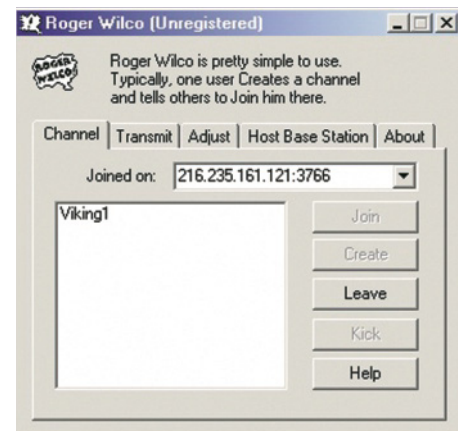
Imitation Recon map created from a screenshot in the Mission Builder

you to discuss options with players who are waiting to fly.

In the case of IL-2 the HyperLobby supports four major variants: dogfight, online co-operative, team play, and dedicated squadron play. You can meet VEF (Virtual Eastern Front) players in the HyperLobby as well as those from the IOW (Ilyushin Online War). Visit www.techsecurity.org/il-2 for information on the VEF, and the IOW can be found at www.jagdgeschwader.com. It's also possible to host missions you have built yourself, using HyperLobby as a meeting place; many online squadrons meet there before their flying events. If this sounds appealing, you'll need to join an individual squadron before you can fly with this group.

Roger Wilco

While IL-2 does sport built-in voice communications, not everybody has found it an unqualified success; thankfully there are other excellent options available. Roger Wilco (<http://rogerwilco.gamespy.com>) is a shareware voice chat application which runs in the background while you fly your



"Pretty simple to use" it says...and it is too

favorite simulation, and allows communication with your friends or enemies simply by talking. The user can create an individual channel or even run a 'Base Station' mode that others can join. Combatants generally set up a separate base station for each side in the conflict, so that pilots flying for either the Russian or the German side can keep track of the changing tactical situation.

Patches and new aircraft

The first (13 Mb) patch was released in December last year, and brings IL-2 to version 1.02b, which is not compatible with the original release. This added the FW-190A-5 as a flyable plane, in addition to expanding the ordnance options for all FW-190s. The patch also corrected some texture errors, revised the sound setup, and tweaked multiplayer code.

Compared to the Bf-109 the Focke Wulf is much heavier, faster in a dive, rolls on a sixpence, and is a much tougher aircraft. The engine and airframe are far more resistant to damage, and the pilot is better protected. Furthermore, with six guns mounted it has terrific firepower.

The FW-190A-5 is slightly more powerful than the A-4 and is designed for use as a Jabo (fighter-bomber), carrying a bomb of up to 500kg as well as external fuel tanks. Additional armour makes it safer for the pilot and increases your chances of survival. Both A-4 and A-5 are fitted with four 20mm cannons and two machine guns in the cowl, which makes them great for taking on bombers; these are particularly nasty aircraft to have on your six!

The second patch, which should be available by the time you read this, will add two more flyable aircraft, including the P.11c. There will also be fixes for Force Feedback configuration, in particular for the Microsoft Sidewinder sticks. Rumour has it that the patch may also enable you to record track files while flying in co-operative online mode. To see other aircraft in development, visit www.il2center.com.



Expand your combat horizons in the HyperLobby

Leonard Hjalmarson

Jumbo Down Under

As real as it gets... really!

We've taken a look at several home-built cockpits in PC Pilot, but in Sydney, Australia, something truly amazing is taking shape...



Matthew Sheil is currently some three years into a ten-year project to build his own 747-400 simulator – not just a program or a simple cockpit, but a 13ft. wide, 11ft. long and 9ft. high full-motion simulator, replicating Boeing's finest down to the very last detail. The initial design phase lasted over a year, and the time spent on this has clearly paid off – Matt's project is currently within 5mm of the real thing. One reason for the length of the design stage is that every part of the 747 is designed to be removed for servicing when necessary.

Half measures is clearly not a phrase in Matt's vocabulary, and he completed much

of the work in 30°C heat without the benefit of air-conditioning.; the controls and linkages, for example, have all been custom-built from the ground up, and adjustable hydraulic dampers with flow valves will be added to give that heavy Boeing feel. Matt spent over 30 hours constructing the rear entry door alone, which is fully sealed and lightproof. Unable to get his hands on any 747 yokes, Matt obtained some from a 737, which are the same shape and style as those fitted to the 747, and has reconditioned and re-coloured them to match the 747 items perfectly. The seats are salvaged from a 747-100, and these will be modified to match those

from the 747, and will have full electronic adjustment.

The last three years have been spent searching the world for parts, many of which have come from Pinal Airpark in Arizona, USA. Matt's had some great successes in finding items on these trips, and it's good to hear that interested enthusiasts from all over the world have donated numerous parts and pieces of equipment – circuit breakers, switches, monitors, reference material, flights and much more; it's the generosity of people like these, Matt says, that keeps him going.

Matt calculates that the cosmetic side of the simulator should be completed within the next couple of years, and that then the really time-consuming and expensive part of the project will begin – actually getting the simulator to replicate perfectly the flying characteristics of the 747. He's got the perfect answer for those who might question his quest for perfection: "To me, it's like someone rebuilding their favourite old car; you don't just bolt on some old Toyota part on to a Ford!"

Matt's website at www.hyway.com.au/747/747.html carries updates on his progress, and he kindly took some time out from his busy schedule to reply to our questions about his project. His answers make interesting reading...

PC Pilot: Does the ten-year time scale still look realistic?

MS: The plan was for ten years and it will still take at least that time. People get the impression from the pictures on my website that it looks almost finished, but it will take many years to get everything working correctly! The 747-400 is very complex, and I hope to simulate (within reason) the majority of functions available in the commercial sims; even they have their limitations. Many of the functions that I would like to implement are not yet available to the PC simmer, but with the help of many talented programmers from all over the world, I am sure that I'll get close to the real thing.

PC Pilot: Have good planning and design avoided any major setbacks?

MS: Planning is a very important part of sim building. I spend three times longer planning than building, but you generally have to modify your design or plans on the run. I get about three requests a week from people asking me for the plans of my sim, but the only way to get them would be to remove the head off my shoulders and scan it into a word document! I don't think people have any idea of how long it takes to create a very simple item. I haven't kept building records as the project progresses because of the high workload that would have been required to achieve this. The rudder pedal assembly, adjusters, and brakes, for example, took over six months of



If you've ever tried welding accurately, then you'll know how difficult this was (1999)



The external skin is added – perfectly shaped (November 1999)

work for two people and as it's all under the floor you can't even see it! I could have just purchased a set of off-the-shelf pedals but I am trying to get to the full realism stage, and a Boeing pilot's feet don't push plastic pedals!

We did have some major setbacks on the auto throttle system gearbox and motor. I'm using the real throttles out of a classic, modified to look and work the same as those from a 747-400; they weigh about 40kg and require a 930:1 ratio gearbox to move them at the correct speed through a chain drive. This is a huge load on the motor and gearbox, and we tried four different motors before finding one with the correct power and speed to drive the gearbox. We burnt out two motors and two gearboxes in testing, and it's not so much the cost of the items, but the time (about a week each time) it takes to modify the mounting assemblies. We now have a great combination working which hasn't failed in over 300 hours flying.

It's often the simplest things that catch you out – a simple door with a lock and hinges for the rear of the simulator ended up taking about six times longer than I anticipated,



Arizona – looks like Matt's got his eye on something already (May 2000)

due to bad design on my part. On many occasions bad design meant that many parts that we manufactured had to be scrapped and replaced after a week or two's work. We called them 'prototypes'!

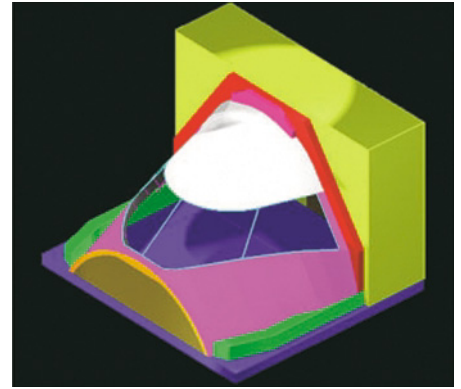
PC Pilot: Is the scarcity of genuine 747-400 parts a problem?

MS: The reason why 747-400 parts are so scarce is because unless a 400 crashes they are still flying! I don't know of any 747-400s that have been put out to pasture yet. 100s and 300s are growing out the ground in the USA like weeds – the biggest problem is finding out where they are and how to get at them. People tend to think that, because they are trashed in the desert somewhere, the parts are free, but they still charge spare parts' prices for most available parts and you can't just go and remove them yourself; you have to pay an hourly rate for someone else to do this for you.

I met dealers that would rather crush the cockpit items than give them away, but I did meet one genuine guy that owned two ex-TWA 747-100s and allowed me (for a reasonable price) three days to remove what



These are from a 747-100, but will be modified to 747-400 specification (May 2000)



Every part of the design was thoroughly tested in CAD

I needed from the cockpits, just a week before they were chewed up. Some dealers want ridiculous prices for worn-out items covered in bird droppings – almost a third of the new price in some cases. I've seen whole 747 and 737 cockpit shells go for as little as US\$3000, but beware! They can cost you heaps to cut and transport and it costs much more to modify an existing cockpit than to build one from scratch. You must remember that an aircraft cockpit was built to fly and be attached to the rest of the aircraft; a simulator is built to be a simulator and this can cause problems. Have you ever looked under the floor of a real cockpit? I'm sure they build them with no intention of ever removing some of those parts.

PC Pilot: Was Aerowinx's Precision Simulator 744 the only viable choice?

MS: PS1 was the only choice! Although other sims and software could have been used to make my life much easier, they just don't cut it in terms of systems and completeness. Hardy [Heinlin, PS1 developer, who spent two weeks in 2000 flying Matthew's simulator] really has the flying characteristics and physics of the 747-400 mastered. Many airline pilots have flown my sim now, and not one has complained about the way it flies. Some sims have great clouds, pretty aircraft, or 90% correct FMCs, but it's the interaction of all the systems and the flying model that really count. FS2000/2002 is fine if you like pretty scenery or want to view the smoke coming off the tyres when you land, but remember that I'm not interested in seeing smoke from my tyres (can a real 747-400 pilot see this?).

Having said that, I use FS2002 linked to PS1 for my visuals, so I get the best of both worlds. FS2002 is great for the home user with a basic setup and plug-and-play controls, but many find that this is not enough after the first 100 hours. I read some time ago that the average simulator pilot spends 10% of his time flying and 90% installing, fixing, and testing add-ons. I spend 90% of my time flying and using systems, and occasionally I look out of the window.



Hydraulic plumbing under the floor for the elevators and aileron pressure feel (June 2000)

PC Pilot: How has testing been going so far?

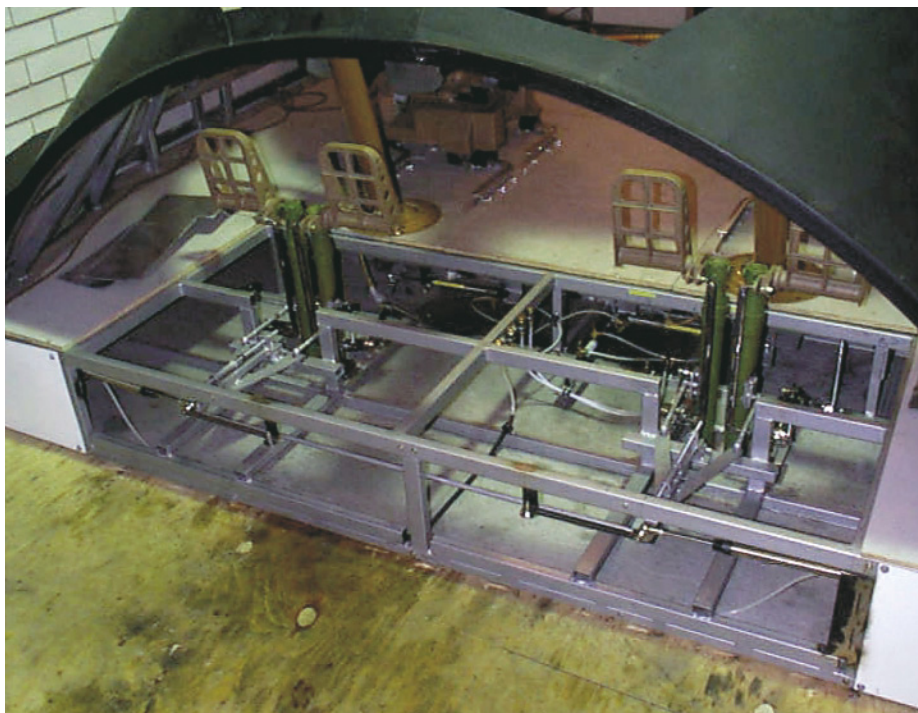
MS: The tests are ongoing! I initially set up a 9-computer network in my office to test and run all the software required (currently 39 programs and utilities running together); you'd be amazed at how stable it all is. When we installed all the computers in early November 2001, we had three days to shake it down prior to World Flight, and we did 110 hours flying during World Flight without any major glitches. I asked a few close friends who fly to come over so we could set the hydraulic pressure of the controls to closely match the 747-400. I was also lucky enough to have two days flying a real 747-400 sim in the USA and that helped me get the feel of the controls right.

PC Pilot: Are you already proficient at welding, hydraulics, CAD, plastic moulding, computers and so on, or are these skills you've had to learn?

MS: By necessity I've had to learn many new skills. I have no trade to talk of, but am driven by ambition and the will to do something. I also surround myself with or find people that possess the skills you mention, and this way I learn the basics involved. My brother did the CAD work, for example; my brother-in-law works in hydraulics, and I found an electronics engineer who is interested in simulation. My company has a plastics moulding division so I have some knowledge in this field. A very clever programmer in the UK is my EPIC programming expert and other sim builders give their advice... the list goes on. Many people and companies have to contribute to a project of this magnitude.

PC Pilot: Are the costs approximately as you anticipated?

MS: I only rate costs without labour. If I had to include labour it would be too scary. The main costs are the little things you don't think about during planning; every other day you're off to the electronics or the hardware store to pick up another cable, bolt or adapter. I've been lucky in that I've had so much donated or given to me over the last three years. People are genuinely interested in what I'm doing and donate the



Gorgeous engineering on the rudder pedal assembly – over 300 hours of work (September 2000)

items or sell them at a great discount. Without the help of these people my project would not be at the stage it is now. I have also had software written at no cost sent to me from all over the world in the past few years.

Cost? I would have to say about US\$150,000 without labour, but this figure would include donated and discounted goods. Labour would have to exceed 6,000 hours by now with helpers who work for free; this alone in Australia would be worth about US\$150,000 on its own. I personally haven't spent anywhere near this figure, but if you wanted to get one built to this level, and had to pay someone to do it for you, this will give you some idea.

PC Pilot: It must be tempting, having the sim at your workplace...

MS: Of course! Many nights are spent working late to 2 or 3am, and then I'm up again at 6am to start again. It can be very frustrating working on a project of this magnitude with nothing to show after weeks of work. People ask me to post more pictures or updates on my website, but sometimes you just don't have anything to show them, or are embarrassed to show what two weeks worth of work has produced.

As I'm self-employed, I get the opportunity to work on the sim at work in my own time. I start work at 5:30am each day and leave at 5:00pm so this gives me some time to work



All the circuit breakers in place (June 2000)



The instructor's station (October 2001)



Precision Simulator 744 - the connoisseur's choice



Unmistakeably Boeing's finest

on my hobby and I can still get home to the family at a reasonable hour. I do spend one night a week working on the simulator, but never do any physical work at weekends, as these days are reserved for my family.

PC Pilot: Pinal Airpark in Arizona sounds very interesting...

MS: Interesting is not the word... more like mind-blowing! It was a dream to wake up each morning and see Jumbos and other aircraft as far as the eye can see. You can't just turn up at and walk in without an appointment or approval letter from your supplier. The airpark is also a military base, so security is strict. I was lucky to find a

company which was willing to sell me what I needed and provide entry, although the company was 2,000 miles away and everything was organized over the phone.

PC Pilot: Have you had any dealings with Boeing?

MS: My internet tracking software shows many visits from the Boeing, Flight Safety and Rockwell Collins servers, but I haven't had any contact with them at all. I did try in the early days, but gave up when no one replied to my e-mails. I was told that Boeing charge a lot of money for aircraft specifications to the commercial sim builders and they have to protect this part of their business. I believe they are also very sensitive about people using their name or the numbers they have registered on their websites, so I have avoided any reference to Boeing or other majors. I know of a sim builder who had the word Boeing in his website name and had to change it after receiving a letter from Boeing's legal department. Rightly so, as Boeing needs to protect its trade mark. I'd like to place a Boeing sticker on the rear of my sim one day if they would let me.

PC Pilot: Have you ever thought that Boeing's designs could be improved on in any way?

MS: No, you can't change perfection. (I'm still after that Boeing sticker for the back of my sim!)

PC Pilot: What advice do you have for anyone thinking of building their own cockpit, even on a much smaller scale?

MS: Plan, plan, plan! Spend at least 12 months planning before you even start building, and draw up exactly what you intend to achieve from the simulator, then you'll know how elaborate or simple you need it to be.



Try convincing anyone that this is actually a simulator!

You must remember that most guys already building sims spend all their free time trying to build, and don't have time to update web pages as often as we would like, or to reply to requests for information that may take hours to collate. Maybe I speak for myself here, but it seems would-be sim builders want everything laid out for them on a platter. You can normally work out who is serious about building a sim when they have already done some of the hard work themselves, and understand that plans for a sim cannot just be emailed back to a request. I would have over six feet of paper work I've created during the construction, which would mean nothing to anyone but me, and there's another six feet of information in my head and in the heads of others that have helped me.

Start with something simple first to work out what you really need, and if you want to get serious, then start doing the numbers. Whatever you think it will cost, double it and add 200%. The more involved you get, the more realistic you will want it to be, so be prepared to start from scratch again in a couple of years if you take short cuts. As a general rule multiply estimated building time by four, or even by six!

Another tip is to take a break every now and then to build up enthusiasm. If you don't touch it for a month or two your interest will build again. If you're willing to

make compromises, many companies are now starting to develop very easy plug-and-play controls, CDUs, and MCPs, and these will be amazing. The setup I've created has its drawbacks too – you always need someone else to help you fly it, and even someone in the instructor's station to operate everything correctly.

PC Pilot: Have you had any more thoughts on the full-motion aspect yet?

MS: Motion is highly overrated! Unless you are performing radical manoeuvres, most vibration systems and force feedback provide this feel; the visual system provides most of what is needed along with sound and vibration.

I will add some kind of full-motion system one day, but it is not high on my priority list. Already you can get vertigo in my current setup just by lifting your head too fast or turning your head. I even had a guy lose his balance standing at the back the other day when we were on approach turning final. The eyes and ears provide the motion...

My next big project is the control loaders for the main controls; this will add even more to the sim. My controls now provide a simplified force feedback using hydraulics and springs. Most of my budget in the next five years will go on the scenery display – I'd like to find a simplified or second-hand

Without whose help...

Many of those who have helped Matt with his project prefer to remain anonymous but he would like to publicly thank them all, including: Hardy Heinlin of Aerowinx (www.aerowinx.de).

John Cavanagh (www.jcavanagh.flyer.co.uk), who has written the Broker to EPIC software and done most of the tricky EPIC work.

Jeroen Hoppenbrouwers (<http://infolab.kub.nl/people/hoppe/ps1/>) who wrote the Broker, SB747, ACARS and FLTCREW. Graeme Rogers and Ted Deller from Command Fliteware (www.commandfliteware.com) and CSI (www.em.ca/~cockpits/main.htm) for their fantastic new Proline series of internal backlit panels.

Ian Riddell for technical advice and much more; Ivan Ngeow for the EICAS and VMREAD software to run PS1 screens over a network; Dusan Lacko, John Howe, Enrico Schiratti, Torrence Johnson, Michael Roberts, Doug Snow, Tom Whang, Urs von Aesch (<http://mypage.bluewin.ch/Visual744/index.htm>), Terry Newans, Paul Hubbert, and, of course, other 747 sim builders.

collimated display that gives no focal point for about 160 degrees view. ■

Matthew Sheil and Mark Embleton

"TAKING YOU TO A NEW FLIGHT-LEVEL OF REALISM!"

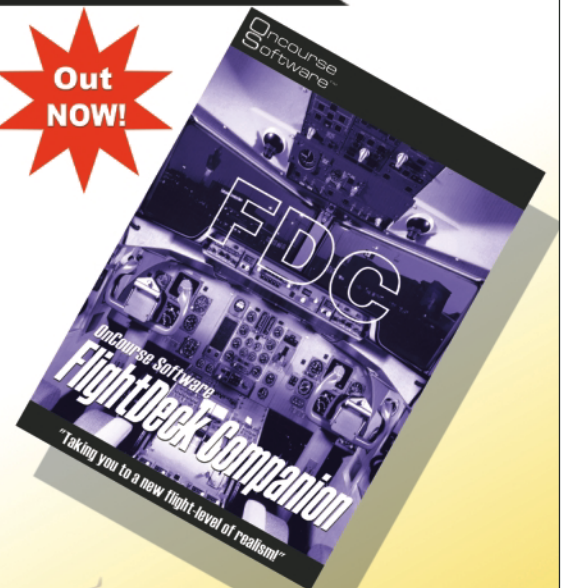
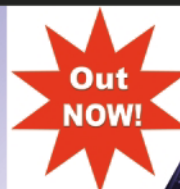
PC CD-ROM

FlightDeck Companion

This exciting add-on, from the author of the award winning freeware program S-Combo, takes flight simulation to a totally new flight-level of realism, by adding incredible audio enhancements to your virtual world. FlightDeck Companion (FDC) works with Microsoft Flight Simulator 2002, 2000 and 98.

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Cessna Caravan Amphibian

Flying and floating in Cessna's long-serving classic

Adding a float endorsement to your pilot's licence opens up a whole new watery world. You're free of the restraints of paved runways and can plant your plane anywhere there's a short stretch of water; hopping from lake to lake, especially in densely wooded country, is often the only way to transport both people and cargo. There's rarely a shortage of water on which to land – you'll find many more lakes than paved runways, and most of them will provide the ideal landing place for your float-equipped plane.



Photo reproduced courtesy of the Cessna Aircraft Company.

Obtaining the float endorsement (also called a seaplane endorsement or rating, depending on the country) is not a lengthy process, and requires from around six to fifteen flying hours; in the US this can be done for as little as \$500. Most of the time is obviously spent practising landings and take-offs on water, and you'll generally be expected to have already accumulated a reasonable number of VFR flying hours (IFR is not required, but it is handy). The tests do vary depending on the examining body, but usually you are required to demonstrate proficiency in landings and take-offs for different water conditions ('glassy', 'normal' and 'rough' are the usual terms), taxiing and docking manoeuvres, landing on paved runways with floats attached, and a number of emergency procedures.

The floats

The actual floats are enormous sealed canoe-like appendages attached by several struts to the body of the plane. As a general rule, the floats (also called pontoons) are each designed to support 90% of the plane's weight, and are rated according to the number of pounds of fresh water which they displace. Most floats are constructed as a number of separate compartments, so that if one compartment is damaged for some reason and floods, the other compartments are enough to keep the plane afloat and prevent the centre of gravity from being too adversely affected.

At the front of most floats is a castor wheel, with the main landing wheels located in the middle of the float; both sets of wheels are retractable for water landings. At the back of each float is a water rudder, used for steering in the water, and these too can be retracted. The plane attached to the floats is usually no different from the land-based version except for additional bracing and sometimes a more powerful engine.

Taking off

Water take-offs follow almost the same procedures as taking off from dry land. Full power should be applied slowly as the floats rise onto the 'step'; release back pressure to allow the floats to plane on the water and gain speed, then pull back very slightly to rise from the water when the speed is high enough. You'll feel a very noticeable acceleration increase as soon as the floats leave the water. Climb performance is hindered a little by the additional drag, but stall speeds are lower.

Landing

Because the floats are very aerodynamic, landing on paved runways with floats attached is really no more problematic than a landing without them, and stopping in water is a lot easier than on land.

The big difference between landing on water rather than solid ground is the



With terrain like this, it's time to find some water to land on



The lake looks much more welcoming than the trees

complete lack of traditional brakes. The floats themselves act instead as enormous brakes due to their drag in the water. By properly manipulating the attitude of the plane, you can control the amount of braking provided by the floats. After touching down on water, pulling back on the controls as you would in a short-field or soft-field landing will dig the back of the floats further into the water, shortening the stopping distance dramatically, often to less than 1,000 feet. Naturally, during take-off you have to be careful to avoid the same effect, which will rob you of take-off speed. Lightly feathering the attitude of the plane is one of the real tricks for successful flying with floats.

One handy aspect of floatplane flying is the ability to land and take off with practically any orientation to the wind. You can land downwind, upwind, or with reasonable crosswind components, as long as there's enough water to allow you to slow down sufficiently. As you would expect, you'd normally land into the wind, but there's no reason for you to have to do this if your chosen lake or stretch of ocean is long enough, and you're competent enough to control the aircraft.

If you are landing into the wind, waves will be coming towards you and will cause a considerable amount of chop or bounce during the first few touches of the water. It's not unusual to touch down and float a few



Land or water? The Amphibian is the ultimate in flexibility. Having a choice is always the best approach

times before settling into the water, and avoiding ‘porpoising’ can often be a struggle in high winds and rough seas. Landing crosswind to the chop is difficult and requires a lot of practice; landing with the wind is a little easier, but does require a far longer landing run.

The most common causes of problems during water landings are lack of proper speed and incorrect attitude. If you come in to land with the nose too low, the floats can dig into the water and flip the plane over; let the nose get too high and the back of the floats cause excessive drag, slamming the front of the plane down. Too fast an approach will cause you to skip across the surface of the water, bouncing up and down. Come in too slowly, and you may plop onto the water surface in a stall.

Taxiing

Taxiing is actually the hardest part of water operations. Obviously, in the water a floatplane has no braking device, and with the propeller turning even at idle and the blades feathered, you still experience some forward movement. In many ways, taxiing a floatplane is like moving a sailing boat: you have to anticipate well in advance and control your speed and heading with care. One factor which is often overlooked, and the effect of which must be minimised, is water spray on the propeller blades. The continual bombardment by drops of water, especially at higher speeds, can result in blades that look as though they have been shot-blasted, quickly reducing their effectiveness and safety. If there is any

wind at all, a floatplane will attempt to ‘weathervane’, because of the reduced friction on the water. Floatplanes will pivot around their floats’ centre line, and some float systems allow you to adjust this centre line, using small water pumps, to permit different taxiing techniques.

Several types of taxiing are used at different times. The most common method is called displacement or idle taxiing; here the body of the plane is supported by the floats’ inherent displacement, and directional control is through the use of the water rudders and, to a much lesser extent, the plane’s rudder. Displacement taxiing is conducted with the controls pulled fully aft (except in strong tailwind conditions). This slightly nose-up attitude allows reasonable airflow cooling of the

The Perfect Water Landing



Drop the flaps, make sure the wheels are retracted, trim for descent rate, and stabilise the approach



A slight flare above the water, and let the floats kiss the surface. Throttle to idle, and keep her steady in case of a bounce

engine, reduces the chance of damage to the propeller from spray, and keeps the nose in a normal position for visibility.

Displacement taxiing is a slow process, so many floatplane pilots use a technique called step taxiing when water conditions are calm enough. This requires a reasonable amount of speed and back pressure on the stick, to the point where the floats rise onto their 'step', resulting in a reduced profile in the water and faster speeds, much like when a speedboat prow rises out of the water as speed increases. The water rudders are retracted during step taxiing, as they have little effectiveness, and the plane's rudder is used for directional control. Turns during this kind of taxiing are hazardous, and can result in the plane tipping.

Finally, 'sailing' can be performed when there is a strong wind or rough water. The water rudders are retracted, the engine is usually off or the prop is fully feathered, and the ailerons are used like small sails to control the direction of the plane's movement, although the movement is almost always backwards (a little unnerving the first few times you try it). This can be a time-consuming and tricky method of moving the plane, but it is effective in poor conditions. ■

Tim Parker

Dr. Tim Parker is a technical writer with over 60 books and 3,000 articles to his credit. When not writing, he's a pilot and scuba instructor. He has been flying real planes for over a decade and used simulators since the first release of MS Flight Simulator for DOS. An ex-pat, he now lives in Ottawa, Canada.

Looks stunning, but the flight model's all at sea!

The Cessna Caravan Amphibian (amphibians can land on water or land; seaplanes land only on water) is the largest single-engined floatplane in production, and is something of a favourite among float aficionados. While the interior of the simulated Caravan is realistic, with the proper information for use in water on placards, for example, Microsoft's version does fall short in a few respects.

The biggest flaw in Flight Simulator 2002 is the ease with which you can land on water. It's as simple as aiming the plane at the surface; there's no damage modelling represented at all, so dipping a wingtip results in as smooth a landing as a perfectly executed approach. Aim the plane straight down at the surface of the water from 1,000 feet, and you'll have a lovely set of trails from the floats as the plane glides after impact. There's a slight sensation of up and down motion from the waves (which really do look lovely!) but nowhere near as much as you'd experience in real life.

Flying with Force Feedback is unfortunately not quite what it could be, as there's no real sensation of each wave hitting the floats as you land or take off.

A few other procedures commonly performed by floatplanes are likewise not particularly realistic in FS2002. While take-offs straight into the wind are preferable, for example, they are not always possible. Crosswind take-offs require very careful attention to the upwind wing, as the slightest rise can cause the downwind float to sink further into the water, raising the upwind float. The result is a quick tipping of the plane followed by capsizing - this isn't modelled in FS2002 at all. Neither does landing the Caravan with the wheels or water rudders down cause any misbehaviour: try that in a real plane and you'll most likely end up swimming.

The inclusion of a floatplane in FS2002 is very much welcome, and the virtual flyer can now land on vast new tracts of the simulated world. Perhaps it's unreasonable to expect a general-purpose simulator to include accurate physics for floatplanes, but then again, now that Microsoft have included the Caravan Amphibian, surely they could have added those special elements of realism specific to floatplane flying?

A float endorsement is a great addition to any pilot's licence, but don't expect the experience to be as easy as it is in FS2002!



FS2002 lets you get away with a smooth landing even when the wheels are down



Superbly reproduced panel in FS2002 - lacking only the more usual signs of hard use



Let the floats slow you down. Using water rudders at this speed is still tricky, but the Caravan slows quickly once in the water



Slow to taxiing speed; use the water rudders for steering, with a little throttle for propulsion. Time to raise the flaps too

Flight Sim Training

Professional instruction with Bill Stack



The charts used in these tutorials have been specially supplied and reproduced with kind permission of Jeppesen GmbH. These charts are NOT to be used for real-world navigation. They are for information ONLY. © 2002 Jeppesen GmbH.



BEFORE YOU START

A few prudent practices that professionals normally apply can make your flights as realistic as possible. The background will also help you enjoy flying while you learn.

OUR FLIGHT AND AIRPORTS

Last summer in tutorial 13 we flew to Pittsfield, Massachusetts, USA, in torrid, hazy weather. Today's 150-mile (278km) flight will take us on a zigzag course from Pittsfield to Teterboro, New Jersey, in cold winter precipitation.

Pittsfield (KPSF) is a small airport in a 19th century industrial town nestled in the rolling Berkshire Mountains of western Massachusetts. Teterboro (KTEB) is the busiest of several general-aviation airports in the New York City metropolitan area, calling itself 'the executive aviation gateway to the New York metropolitan area' and the 'oldest airfield in the region'. Learn more about Teterboro at its web site: www.teb.com.

This flight features several aspects of instrument and visual flight. We will fly IFR in the snowy conditions of late January 2002, when we started writing this tutorial. When we get to Teterboro, we will follow its visual approach to runway 06. This visual approach is unusual and challenging, because it entails fixes, step-downs and similar procedures common to instrument approaches, but the pilot must rely on visual cues from outside the aircraft. As with several recent tutorials, Teterboro's visual approach is another reason why IFR pilots should maintain their visual skills.

OUR AIRCRAFT

We like flying the Mooney Bravo, because it's an easy and fun plane to fly, and it gets us to our destinations in about 25% less time than the Cessna 182s. In the Bravo, this 150-mile flight will take about 70 minutes. You're welcome to fly this route in another aircraft type after flying it with us in the Bravo.

THE CHARTS

Be sure to familiarise yourself with the Jeppesen charts we will use for these tutorials before embarking on the flight, so you will know what to do aloft. These charts show the flight path, fixes and navigation aids. As well as the charts reproduced from the Jeppesen SIMCharts program that you'll see in this tutorial, we've included high resolution images of the charts

on the cover CD. For more information see page 10.

PROFESSIONAL FLIGHT PRACTICES

As usual, we steadfastly emphasize the need for following prudent aviation practices. Applying them or not can make the difference between a successful or a failed flight.

USE FLIGHT PLANS

Flight plans are required for instrument flight, so we always recommend using them for the most realistic flight simulations. You are free to use paper plans or an electronic flight planner. Paper plans are a bit clumsy to make but easier to use aloft. Electronic plans are easy to make, but using them aloft requires following submenus that disrupt the simulation.

In lieu of filing your flight plan with ATC (Air Traffic Control) as real pilots do, imagine that you have filed in accordance with regulations. Keep your flight plan handy throughout the flight so you can easily refer to it. After your flight, file it in a folder or loose-leaf notebook.

NOTE THE TIME

We always jot down the time of significant events during our flights, and we recommend your doing this too. Note the time of take-off, the time of passing significant fixes and nav aids, and the time of arriving at the destination airport's airspace. Recording your times and tracking your progress help make the flight more interesting and come in very handy at the destination airport.

COMPENSATE FOR WIND

Be sure to account for winds in your plan, because deviations from your desired course will consume additional fuel and delay your arrival. Our tutorial in Issue 4 explains wind compensation in detail.

MONITOR YOUR PROGRESS AND STATUS

Throughout your flight, check your instruments for the status of your aircraft and engine. Check your position frequently, and also radio nav aids, time/speed/heading and/or GPS. Monitor your engine-temperature, oil-pressure, fuel-flow and fuel-supply gauges. Correct as necessary to maintain the desired course, altitude and performance levels. At the end of the flight,

compare your estimates to the actual performance in time and fuel consumption.

SIMULATE AIR TRAFFIC CONTROL

FS2002 pilots have been enjoying ATC in our recent tutorials. Today's flight within the US will take us from sparsely travelled airspace to New York City's busy airspace. The New York City area's Class B airspace requires strict adherence to ATC procedures and clearances. If you don't have ATC, pretend that you are performing the recommended ATC communications.

FLY ONE STEP AT A TIME

While leaping over the basics and plunging into advanced flights is a great luxury of flight simulation, it is not realistic. Real pilots do not start at the end of the training course and work backwards, because it deprives them of the skills needed for meeting subsequent challenges. When flight simmers try to meet challenges for which they are unprepared, they frustrate themselves with poor performance and errors. So we strongly advise doing everything one step at a time and building your skills toward the next levels, just as real pilots do. Pause your sim at any time you consider it necessary, as you will not have a certified flight instructor in your cockpit to help you.

USE THESE TUTORIALS FOR FLIGHT SIMMING ONLY

These tutorials are intended for computer flight simulation, not for real-world aviation or real-world flight training. While making our tutorials as realistic as possible, we have adapted them out of necessity to the limits and nuances of flight simulation, so some aspects cannot and do not apply to real-world flight. Therefore we caution everyone to use these tutorials for their intended purposes, and we accept no liability for anybody's misuse of them.

OUR AUTHORS

Bill Stack is an expert flight simmer and author of several popular flight sim books. Nels Anderson, our technical consultant, is a certified pilot and president of flightsim.com. Learn more about flying like a real pilot from Bill Stack's five flight sim books at www.topskills.com/fltsim.htm.

VISUAL APPROACH

Teterboro's visual approach for runway 6 combines elements of instrument and visual approaches. We'll fly from fix to fix and step

down in accordance with clearly described procedures, but we'll rely on references outside our aircraft for position information. Because

this airspace and this airport are so busy, we must be sure to adhere to the specified procedure.

REFER TO OUR PRIOR TUTORIALS

Details of all our previous tutorials by Bill Stack can currently be found on our website www.pcpilot.net, and as from the next issue these will be listed on the Cover CD instead of in the magazine.

If you don't have all the tutorials in this popular series, some are available in the back issues of

which we still have copies remaining. Those issues which are now sold out are available in a handy CD format, each one containing three complete issues. The CD containing the first three issues of PC Pilot contains complete tutorials 1 – 8. As the back issues continue to sell

out, we will be publishing them on CD. For more details see the subscriptions page in this issue or the website www.pcpilot.net.

If you don't have access to the Internet, just drop us a line and we'll be happy to post full details of past tutorials to you.

FLIGHT SETUP

Prepare your simulator for your flight. It takes only a few minutes, and it makes your flight more challenging, more realistic and more fun.

GET YOUR WEATHER BRIEFING

We began writing this tutorial in January 2002, when the northeast United States was experiencing typical winter weather. Snow was falling throughout the area, and temperatures were near freezing at the surface, and well below freezing aloft. As is common on the east coast, precipitation was wetter near the coast than inland, so snow was falling in Pittsfield, and rain and snow were mixed in the New York City area. But visibility was good enough for a visual approach at Teterboro.

Because this tutorial needs IMC (Instrument Meteorological Conditions) from our departure airport through about half the flight, and visual weather at our destination airport, we'll use global and local weather settings. For general background weather, select 'Global'. For weather at each airport, select 'Local'.

Global Weather

Visibility: 5 miles
Wind: 11 knots from 025 degrees
Clouds: Stratus, overcast, Ceiling 2,500 MSL, Top 5,500 MSL
Icing: moderate
Precipitation: snow
Temperature, dew point up to 3,000: 28°F/-02°C, 26°F/-03°C
Temperature, dew point up to 6,000: 13°F/-11°C, 10°F/-12°C
Temperature, dew point up to 9,000: -02°F/-19°C, -03°F/-20°C
Temperature, dew point up to 12,000: -17°F/-27°C, -19°F/-29°C
Pressure: 30.15

Weather at Pittsfield (KPSF)

Use 'Local weather'.
Visibility: 5 miles
Wind: 11 knots from 360 degrees
Clouds: Stratus, overcast, Ceiling 2,500 MSL, Top 5,500 MSL
Icing: moderate
Precipitation: snow
Temperature, dew point up to 3,000: 25°F/-04°C, 22°F/-06°C
Temperature, dew point up to 6,000: 10°F/-12°C, 07°F/-14°C
Temperature, dew point up to 9,000: -03°F/-19°C, -04°F/-20°C
Pressure: 30.10

Weather at Teterboro (KTEB)

Use 'Local weather'.
Visibility: 10 miles
Wind: 09 knots from 050 degrees
Clouds: Stratus, broken 5/8 Ceiling 4,000 MSL, Top 6,000 MSL
Icing: none
Precipitation: none
Temperature, dew point up to 3,000: 32°F/00°C, 29°F/-02°C
Temperature, dew point up to 6,000: 17°F/-08°C, 15°F/-09°C
Pressure: 30.05

Making this flight during daylight or at night is your choice, because there is no practical difference for instrument flights. (Refer to our Issue 6 tutorial for details of night flying.) To make the flight more interesting, try taking off before dusk or dawn, so that light conditions will change en route.

PREPARE YOUR AIRCRAFT

Be sure to prepare your aircraft for flight before taking off by setting your radios and gauges and turning on your lights. The following conditions generally apply to most flights. For this flight, choose the Mooney Bravo, preferably the IFR version. All our time estimates are based on this aircraft. Because the 11-knot wind at Pittsfield is from 360, the best runway for taking off is 32. Start your flight at the take-off point of runway 32.

Calculate your fuel needs and carry enough for this trip, using the aircraft's average fuel-flow rate plus legal requirements to determine the amount of fuel required. Remember that our Mooney Bravo uses about 16.5 gallons of fuel per hour from take-off to landing, and we must include enough to reach an alternate airport and remain aloft for an additional 45 minutes. Our estimate for today's flight is between 25 and 35 gallons. What's yours?

SET UP YOUR AIRCRAFT

'Buy' enough fuel based on your fuel calculations. Your fuel mixture should be rich, and your propeller pitch should be low at these low altitudes. The cowl flaps should be fully open while on the ground and during take-off and climbout. The carburettor heat should be off, because it is not needed and its use will reduce performance when the best is needed. The pitot heat won't be needed unless the temperatures are below freezing and there's moisture in the air.

TUNE YOUR RADIOS

Although you can rely on your GPS for navigation, you still need your conventional radio nav aids for airport operations, and as a backup during the en route portions. Set your Nav-1 and Nav-2 radios and your OBI for the first frequencies and radials you will use.

SET YOUR GPS

Engage your GPS by displaying it on your screen, then check the displayed course to be sure it reflects your desired flight path. Don't worry about SIDs, STARs or IAPs, because the Microsoft GPS does not reflect them. Set the map for 'north up', 'course up' or 'track up', whichever you like best.

As usual, pilots should know how to use the GPS devices in their simulators; that is, how to engage the devices, change view screens, select data and so forth. Read your manual for instructions.

SET YOUR GAUGES

As standard procedure, set your altimeter for local barometric pressure.

TURN ON YOUR LIGHTS

Turn on the lights appropriate for this flight. Nothing is wrong with using the position lights and strobes during daylight operations, even though they are required only for night flights.

Strobes are required at night except when their reflections from clouds would present a safety hazard to the pilot. Landing lights are recommended for taking off, landing, and whenever flying below 10,000 feet (3,050m) above MSL (Mean Sea Level).

PREPARATION CHECKLIST

(This checklist is for these tutorials only, and is not intended to be complete.)

Aircraft Settings

Engine:	running
Fuel supply:	adequate
Fuel mixture:	richest
Propeller pitch:	highest
Cowl flaps:	open fully
Wing flaps:	10% (specified by Mooney)
Carburettor heat:	off
Pitot heat:	as needed
Rudder:	straight
Ailerons:	neutral
Elevator trim:	neutral

Gauges

Altimeter:	local pressure
Amperes:	neutral
Vacuum:	green
Oil pressure:	green
Fuel pressure:	24 psi (specified by Mooney)

Radios

Com-1:	127.50 (Albany Departure)
Com-2:	not needed
Nav-1 Primary:	114.3 (Pawling PWL)
Nav-1 Standby:	117.6 (Kingston IGN)
Nav-2 Primary:	115.1 (Chester CTR)
Nav-2 Standby:	114.3 (Pawling PWL)
OBI-1:	023/203
OBI-2:	099/279
ADF:	not needed

GPS

Map view:	ON
Orientation:	as desired
Zoom level:	as appropriate
Plotted course:	as filed
Displayed:	as needed

Lights

Beacon:	ON
Strobe:	ON
Position (navigation):	ON
Landing:	ON
Taxi:	ON

Clock

Local time or your choice

Simulator

Aircraft runs out of fuel

Make a Flight

After you've set up your aircraft, make a flight so you can bypass all these efforts on repeat flights of this tutorial. Name your flight 'Pittsfield KPSF 06 TO Bravo'. In the description box, enter 'Taking off from Pittsfield (KPSF), Massachusetts, USA, for Teterboro (KTEB), New Jersey, USA, in the Mooney Bravo for PC Pilot tutorial 16'.

IFR (Instrument Flight Rules) Tutorial Part 16

Half and Half – Transitioning from IFR to VFR

Instrument and visual skills are again combined to provide us with another unique challenge. In this United States flight, we'll leave Pittsfield (KPSF), under instrument flight rules (IFR), then we'll arrive at Teterboro (KTEB) visually. Once again, users of FS2002 will enjoy ATC. However, certain aspects of our flight are not supported by FS2002's ATC, so we'll need to improvise. Remember that ATC is required for IFR flights and all KTEB traffic unless communication radios are inoperative.

YOUR FLIGHT CHARTS

Required procedures for today's flight are shown on the charts. Pittsfield has no formal departure procedure. Airways between Pittsfield and Teterboro are shown on the en route chart. The Passaic River visual approach to Teterboro's runway 06 is shown on the respective approach chart.

Departure

Runway 32 is best for today's brisk northerly wind, but it's only 3,500 feet (1,068m) long. Although that's enough for our Bravo, there won't be much room for errors. Today's high pressure and cold air combine to improve the aircraft's performance and help with our take-off.

The simplest departure procedure would be to turn left and head southwest to join the V487 airway at the HIDAL intersection. But mountains two or three miles west of this airport reach about 2,000 feet (610m) MSL and 800 feet (245m) above the airport elevation. They're not shown on the IFR charts, we can't see them through the obscuring clouds, and we won't have ATC assistance to guide us around them. Moreover, vectoring aircraft into mountains is a common complaint about FS2002's ATC in the Internet newsgroups. Accordingly, we need to take this matter into our own hands. We found that we can easily climb over these peaks by heading straight out from runway 32, then turning left and heading 270 towards the airway as we pass through 2,500 MSL.

En route

Several airways lay a path southward towards Teterboro, but none leads us directly there. Most of them head south/southwest, and one heads southeast for 13 miles. Altitudes for IFR flights in the United States are even thousands for westerly headings and odd thousands for easterly headings, so we'll need to change altitude for this short leg. The MEA (Minimum En route Altitudes) vary from one airway to another, and the lowest is 3,000

feet (915m) MSL. We'll fly at 8,000 feet (2,440m) MSL, because weather conditions are better up there today.

The charted airways leading us from KPSF to KTEB end at the VALRE intersection, so we'll fly straight from VALRE to the KTEB approach procedure for runway 06. To join the approach procedure for KTEB runway 06, we need to fly about eight miles west of KTEB. So from VALRE, we'll head southwest towards Caldwell/Essex County Airport (KCDW), because it's the closest waypoint to the first fix of the visual approach procedure. We'll remain under ATC auspices, but FS2002's ATC might not provide the needed guidance.

Approach

Runway 06 is best for landing in Teterboro's northeasterly winds. The Passaic River visual approach procedure starts about eight miles west of the airport. We'll follow the 138 radial towards Kennedy VOR (JFK), then turn left at the correct point and head directly to the runway.

Notice that this visual approach entails elements of an instrument approach, such as distances to a VOR and altitude step-downs. It also includes visual references outside the aircraft, such as factories and shopping malls. FS2002 does not provide all these visual references, so we'll rely on the instruments and watch the scenery that passes below us during our approach. Notice also that this procedure requires radar guidance and is approved only for cloud ceilings at or higher than 3,500 feet (1,068m) MSL.

Fixes on the approach chart are labelled with the letter 'D' and a number followed by 'JFK'. This coding method means that the fixes are the number of miles shown to JFK VOR according to your DME. For example, D23.5 JFK is 23.5 miles to JFK VOR per DME. Accordingly, you'll know you're at this fix when you're on the JFK 138/318

radial and your DME says you are 23.5 miles to JFK VOR. By subtracting the numbers on the fixes, we can see that the approach path along JFK's 138/318 radial is about six and a half miles long, so it will take three to five minutes depending on your airspeed.

Notice also that these fixes are positioned near significant visual references on the ground, such as a shopping mall, a college and a power plant. These references are not shown in FS2002, so we simmers must rely on DME and imagine the visual references.

The text below the approach chart explains the altitude step-downs. The instructions state, "...descend after the Willowbrook Mall so as to cross the Cedar Grove Reservoir at 2,000' (recommended) and the Garden State Parkway at 1,500' (mandatory). Follow Route 3 until the Passaic River, then commence a turn and descent for Runway 6".

PLAN YOUR FLIGHT

Based on these charts, lay out the course you will fly from Pittsfield to Teterboro. Include the relevant airways, nav aids, intersections and fixes shown on the charts.

Use traditional paper charts and flight plans, or Microsoft's electronic flight planner. Paper charts and flight plans are still useful for seeing our course and estimated times at a glance. The electronic flight planner works with the GPS. If you use GPS, the display will show the course you plotted. You might try the flight once with electronic flight planning and once without for the different experiences.

Enter the following data on your flight plan, whether paper or electronic:

Departure: Pittsfield, Massachusetts, USA
(KPSF) Runway 32

Arrival: Teterboro, New Jersey, USA
(KTEB) Runway 06

Waypoint: CANAN intersection

Waypoint: HIDAL intersection

Waypoint: BOWAN intersection

Waypoint: STUBY intersection

Waypoint: Pawling VOR (PWL)

Waypoint: Kingston VOR (IGN)

Waypoint: VALRE intersection

Waypoint: Caldwell/Essex County Airport
(KCDW)

Waypoint: Kennedy VOR (JFK)

Altitude: 8,000 feet (2,440m) MSL

Note: We won't fly to CANAN intersection, Caldwell airport or JFK VOR. We're simply



High terrain beyond Pittsfield's runway

using them to establish our course in the flight planner.

BEGIN YOUR FLIGHT

After you have prepared your aircraft, your cockpit and yourself for this flight, contact ATC and request clearance to take off. Contact Albany Clearance on 127.50, and request take-off clearance. This small airport at Pittsfield is controlled by ATC at nearby Albany International Airport in New York State. Again, those of you without ATC features should imagine these contacts and clearances.

TAKE OFF

Begin your take-off procedure as soon as you receive clearance from Albany Clearance. First, set your transponder for the assigned squawk code. (Use 0367 if you don't have ATC; that's the code ATC gave us.) Next, announce your take-off on the CTAF (Common Traffic Advisory Frequency) for this airport at 122.7. Tell other pilots on the frequency that you will depart straight out. Finally, advance your power and start your take-off roll promptly. Don't dawdle after receiving take-off clearance, because safe traffic control relies on pilots following through and conducting themselves as controllers and other pilots expect.

Soon after taking off, Albany Clearance delivery will hand you off to appropriate ATC. (A handoff is transferring an aircraft's radar identification from one controlled airspace to another.) In this case, your first handoff will be to Albany Departure. Later, you will be handed off to New York Approach. If you're not using any ATC features, imagine these hand-offs as you fly.

As usual in real-world flight, some ATC communications do not concern you or your aircraft. They concern other aircraft flying in the same area, or communicating with the same controllers on the same frequency you are using. Follow only those communications that apply to you, and disregard the others. Use the "Say again" feature whenever you're not sure of what you heard.

Check your engine instruments during your take-off roll. The Bravo's manifold pressure should be at or above 38, and the oil pressure should be at least 24. The Bravo should lift off at about 60 to 65 knots. (Different characteristics apply to other aircraft.) If your aircraft isn't performing normally, abort your take-off.

During take-off and climbout on this flight, you will have a headwind combined with a crosswind from the right. After changing heading to follow our chosen course, you will have a tailwind from about your five o'clock position.

Adjust your pitch to maintain about 85 knots during your climbout. As you're climbing, adjust your cowl flap to keep your

engine temperature in the green range - neither too hot nor too cool.

After your initial climbout, your Bravo should be able to climb easily at 700 feet per minute and 120 knots. Retract your flaps when your airspeed reaches 90 knots.

DEPART PITTSFIELD

To avoid striking any mountains in the Pittsfield area, we'll head straight out from runway 32 until we reach 2,500 MSL, then turn left and head 270 degrees towards the V487 airway.

Icing is likely in this cold, wet weather. With surface temperatures being near freezing, all altitudes will be below freezing. (Although there are some exceptions to this basic guideline, they don't apply today.) This means that your aircraft is susceptible to icing as you fly through clouds during this flight, so turn on the de-icers and pitot heat when flying through clouds.

If you use Microsoft's electronic flight planner, you may follow the green course line on the display screen. If you are using GPS but not the flight planner, maintain your heading to the airway until you see it appear on your GPS screen.

While GPS makes navigating and plotting very easy, it also eliminates the challenges that make these flights interesting. So to avoid the likely boredom, try relying on common radio navigation methods for maintaining your course and plotting your positions en route. You can use DME and radials from Chester VOR to track your position as you head southwest, or you can use the age-old time/distance/speed method.

You should reach the airway five or six minutes after taking off from Pittsfield, depending on your airspeed. Without GPS, you can use the 021/201 radial from/to PWL. Just before reaching this radial, turn left 50 degrees and head 201 towards PWL on its 201/021 radial. Adjust course as necessary to maintain the radial towards HIDAL, and continue climbing towards your 8,000 MSL cruising altitude. When you are 30 miles to PWL along this radial and 25 miles from CTR on its 109/279 radial, you are at HIDAL.

FLY EN ROUTE COURSE TOWARDS TETERBORO

Continue past HIDAL on your 203 heading towards the BOWAN intersection. This course between these intersections is a ten-mile leg of the V487 airway. Write down the time that you passed this waypoint, because you should reach BOWAN in three or four minutes, depending on your airspeed.

The 360-degree wind will push you ahead for most of this southerly flight. This effect will shorten your durations between waypoints and blow you slightly off course, depending on your heading.

Although you'll be flying over plenty of lovely western New England and Hudson River Valley scenery, you won't see much of it during this IFR flight. Changing your headings and altitudes as you fly from leg to leg will give you things to do and make the flight more interesting. Pay attention to your aircraft's status, and keep it on course and at the proper altitude.

Remember from previous flights that your engine will behave differently at various altitudes. The higher it gets, the less oxygen it will have for combustion, so you will need to adjust the fuel/air mixture to compensate. Otherwise the engine will not perform at all well. The engine is performing best when the TIT (Turbine Inlet Temperature) gauge reads between 1,600 and 1,700, so adjust the mixture so that the TIT is within this range. Do not exceed 1,750. (Again, these performance readings do not apply to other aircraft.)

Conserve fuel by changing the propeller pitch at higher altitudes. Our Bravo cruised easily at 170 knots and used 15.50 gallons of fuel per hour with the following engine settings: RPM 2,100, manifold pressure 34, and TIT 1,600. If your engine is using fuel too fast, you could run out of fuel short of your destination. Adjust your settings until your airspeed and fuel-flow rates are optimised.

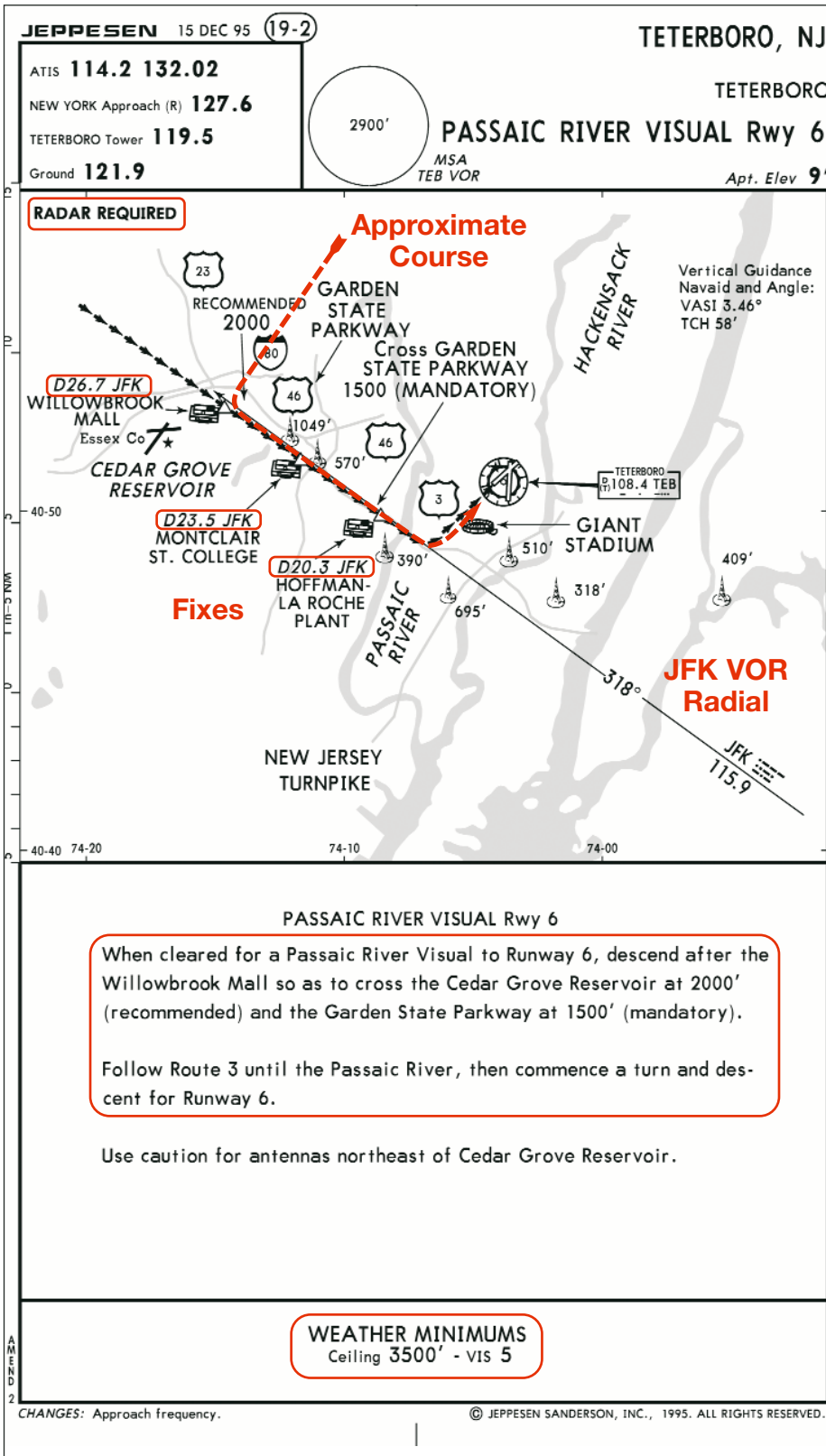
Paying attention to your progress and status is always important, regardless of the flight's length. You can easily pass important waypoints if you are distracted.

Cruise en route

Normally we would reach a cruising altitude and maintain it until we needed to begin the descent towards our destination, but the next leg of this flight requires an altitude change. In the US, easterly headings require odd-numbered cruising altitudes, and this leg of our flight heads easterly (175 degrees, to be exact). Accordingly, we'll cruise at 8,000 MSL for most of the flight, and climb or descend 1,000 feet to meet the appropriate IFR altitude requirement for this leg. As the pilot, this choice will be left up to you. You may use your autopilot to hold these altitudes, but be sure to change them as appropriate.

Cruising in the yellow zone of your airspeed indicator is all right if there is no turbulence. Abrupt manoeuvres are prohibited at these speeds, but straight and level flight is no problem in calm air. If you experience or expect any turbulence, keep your airspeed in the green zone. By the time you will make sharp turns for the airport approaches, your airspeed will be well within the green zone.

When you reach BOWAN intersection, change your heading to 175 degrees by turning left 28 degrees, and join the V91-487 airway. Also, climb or descend 1,000 feet, as you need to meet the IFR altitude requirement for this easterly heading.



Passaic River visual approach to Teterboro Runway 6

STUBY intersection is 11 miles to PWL on its 055/235 radial. Reset your OBI course deflection needle (CDI) to these radials so you can know when you arrive at STUBY. Just before reaching STUBY, turn right 60 degrees and follow airway V93 towards PWL along its 055/235 radial. Do not wait until you reach STUBY to begin this turn, or you will overshoot your course. Return to your 8,000-foot altitude for the remainder of this southwesterly en route phase.

At Pawling VOR, turn right 15 degrees and head 250 towards Kingston VOR (IGN 117.6) along this leg of the V93 airway. Your CDI should already be set for this VOR. At IGN, turn left and head 203 outbound along the V157 airway towards VALRE.

Use any free time during this flight to familiarize yourself with the upcoming legs and the visual approach to Teterboro's runway 06.



Pittsfield Airport to VALRE intersection on Jeppesen's IFR en route chart US (L0) 46

Exit the airways

The chart shows that VALRE is 14 miles from IGN along its 203 outbound radial. When you reach VALRE, you'll be as far south as these airways take us towards Teterboro. Jot down the time you arrive here, because you will need this information later. Turn right 17 degrees at VALRE and head 221 degrees towards KCDW. From here, you will follow a 'freelance' course towards the initial approach point for Teterboro's visual approach to runway 06, but you will remain under ATC auspices.

Descend towards your destination

At a 750-foot-per-minute descent rate, you should begin descending when about 18 miles to KCDW. Remember our simple formula for determining when to begin descending: Cruise altitude (C) less target altitude (T) times 0.003 equals distance from target in miles (D), or $(C-T) \times 0.003 = D$. In this case, $8,000 - 2,000 = 6,000 \times 0.003 = 18.0$ miles.

How will you know when you are 18 miles to KCDW? The age-old method of calculating heading, speed and time (called 'reckoning') will provide your answer. According to the charts, KCDW is 38 miles from VALRE, so 18 miles to KCDW is 20 miles from VALRE. At a cruising speed of 160 knots, you'll cover this 20-mile distance in seven minutes. So when seven minutes have elapsed since you passed VALRE, you're approximately 18 miles to KCDW. Be sure to use your actual speed in your calculations, not our hypothetical speed. Check your clock frequently, because you have no other means of knowing when to begin your descent.

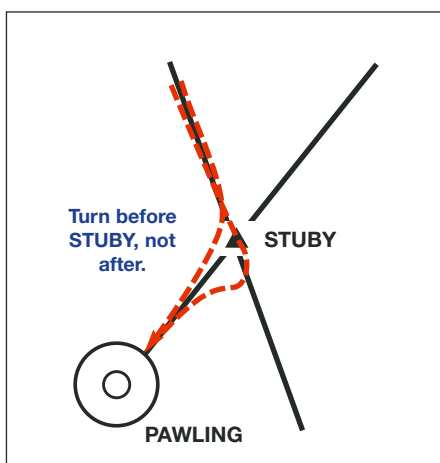
The visual approach to Teterboro's runway 06 recommends entering the procedure at 2,000 feet (610m) MSL, so do not descend below this altitude until you reach the correct point inside the approach procedure.



VALRE intersection to Teterboro Airport on Jeppesen's IFR en route chart US (L0) 47

This seven-minute descent is an ideal opportunity to prepare for your approach and landing. Familiarize yourself with the visual approach procedure at Teterboro. Read the instrument approach procedure chart, and jump ahead in this tutorial to the section about the visual approach. Listen to Teterboro's ATIS for local weather information. Reset your altimeter for local pressure so your altitudes will be correct when you enter the arrival procedure. Switch fuel tanks to the one with the must fuel. Tune your Nav-1 to JFK VOR at 115.9 and your Nav-2 for TEB VOR at 108.4. You will use them for your visual approach, and you need to know when you are at the appropriate position. As you get closer to KCDW, reduce your airspeed to about 100 knots so you can smoothly execute the turns and follow the procedure.

After you descend below the ceiling, you will see the urban area of Northern New Jersey, which is also part of the metropolitan area of New York City.



Executing a sharp turn at STUBY

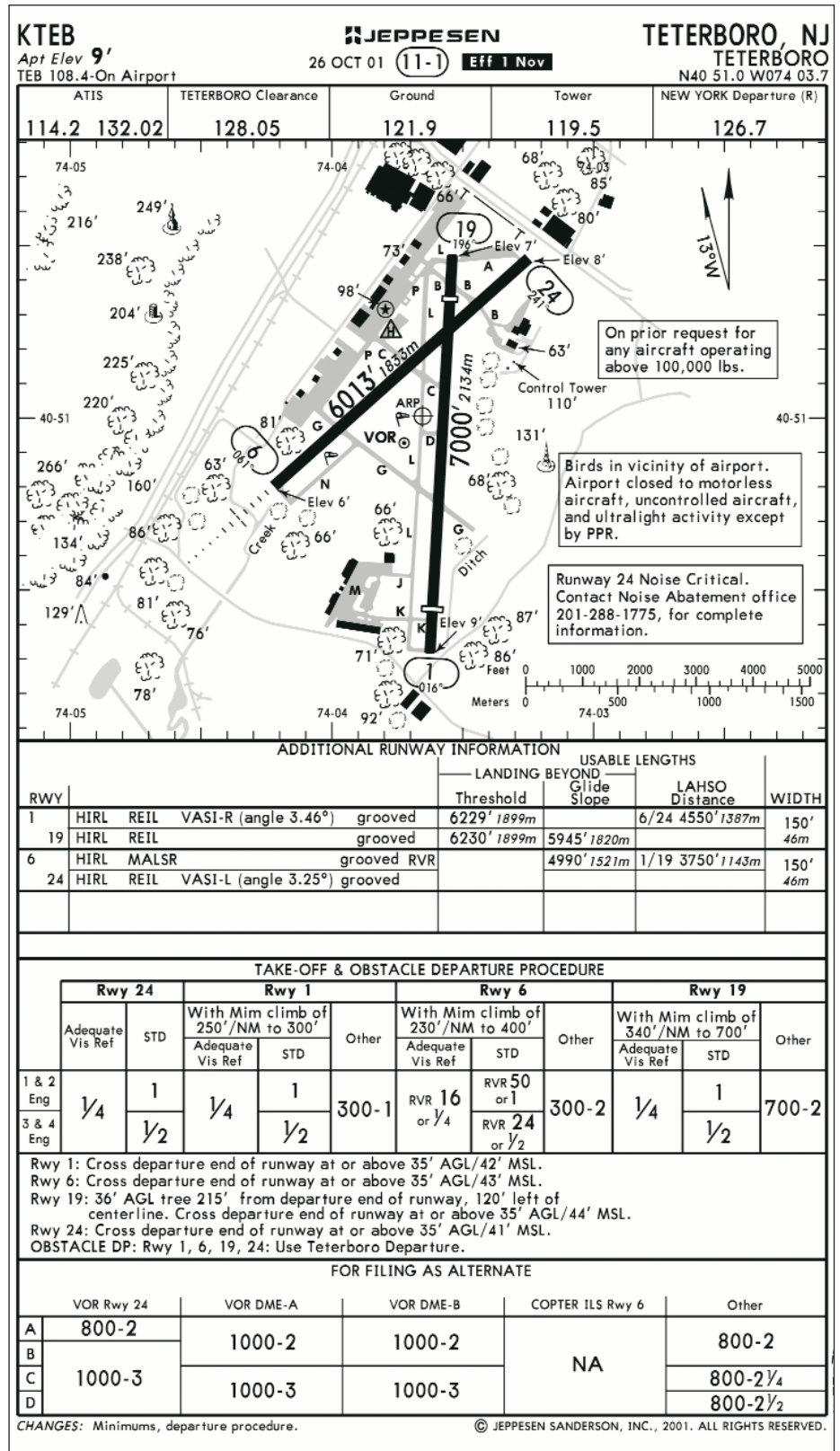


Diagram of Teterboro Airport (KTEB)

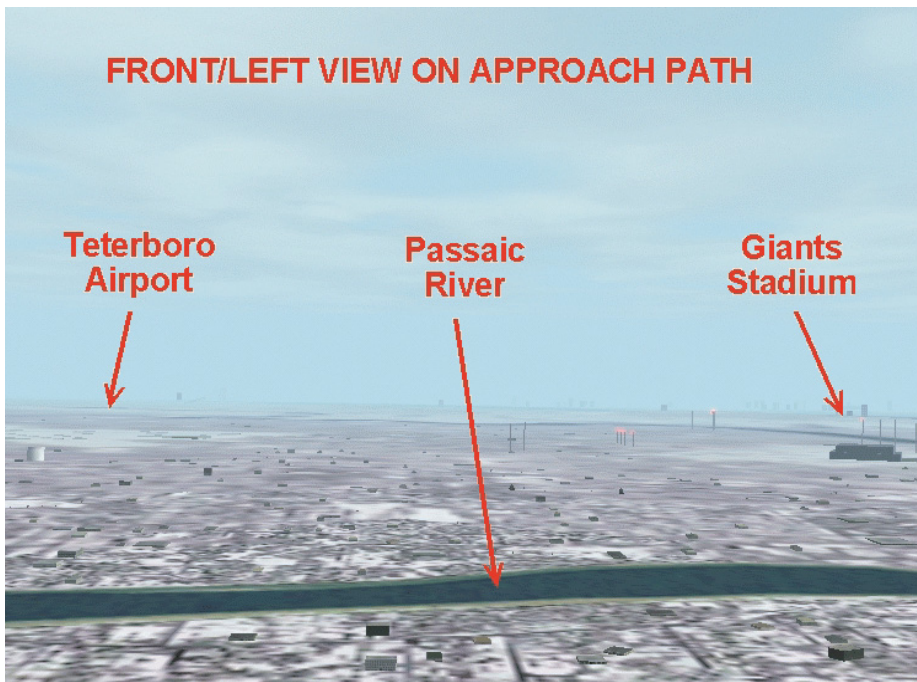
Contact KTEB tower at 119.5 before reaching the approach procedure and announce your intention to land.

JOIN TETERBORO'S VISUAL APPROACH PROCEDURE

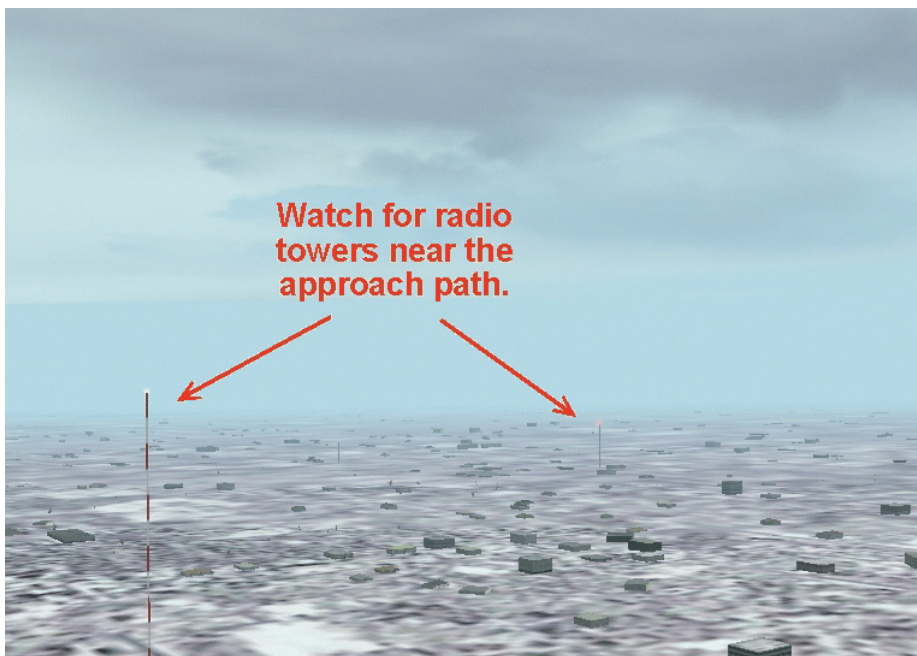
As you follow the visual approach to Teterboro's runway 06, you'll see how it shares features of IFR and VFR approach

procedures. Without radar and all the required visual references, we'll improvise the approach using the radio nav aids and charted fixes.

Pause your simulator anywhere you need to, because many tasks follow one another in quick succession, and you will not have a flight instructor in the cockpit to help you with these lessons.



Front/left view during base approach path



Radio towers near approach path

A few miles before reaching KCDW airport, you will turn left more than 80 degrees and follow the 138/318 radial towards JFK VOR. Watch the radial's relation to your aircraft, and begin your left turn before intersecting it. Here's a procedure we used in lieu of radar vectoring: When we intercepted JFK's 145/325 radial, we turned left 21 degrees and headed 180, then intercepted JFK's 138/318 radial a minute or so later at a 40-degree angle instead of an 80-degree angle. Once you're headed 138 towards JFK, adjust your heading as necessary to follow its 138/318 radial.

If you have been following the GPS course line, disregard it from here on. You won't need your GPS any longer.

The default FS2002 scenery includes three of the visual references shown on the approach chart. The first you will encounter is a 1,049-foot radio tower just before you reach D23.5. It should be to your left as you pass it. The second is the Passaic River, which is visible to the left and then ahead after it curves southward across your path. The third is Giants Stadium just southeast of the airport. This large stadium is plainly visible out the left front window as we head 138 along the approach path, and it will then appear to our right during our final approach.

In lieu of several key visual references in the scenery, we simmers must rely on the DME fixes. Therefore, step down from 2,000 MSL



Front view during base approach path

to 1,500 MSL when you pass D26.5 JFK. Hold this 1,500-foot altitude until you turn towards the runway at the Passaic River, which is just after D20.3.

After you pass D20.3 JFK, look towards your left, left/front and ahead for the river, the stadium and the runway. As you cross the Passaic River, turn left about 80 degrees and descend as appropriate for your final. The stadium should be to your right after this turn.

The rest of this approach is a standard visual final approach, so execute it as usual. Lower your landing gear and flaps, switch to the tank with the most fuel, and so forth.

Missed approach?

If your final approach isn't positioned well for a safe landing, you must abort and start over again. Although this procedure shouldn't be a problem, it can go wrong if you turned left towards the runway too soon or too late, or if your turn was too wide, or if your airspeed was too fast. With this being a visual approach, the chart provides no missed-approach procedure. Simply execute a standard visual go-around procedure by flying over the runway and following a standard left-turn traffic pattern – upwind leg, crosswind leg, downwind leg, base leg and another final approach.

CONGRATULATIONS

You have successfully reached and approached a busy general-aviation airport using a specified visual approach procedure. Well done, indeed!

Keep flying this tutorial to build your proficiency. Apply stronger winds and turbulence and advance to more sophisticated aircraft to make it more challenging if you like. See you next time. ■

Bill Stack

Our next tutorial

In Issue 17 we will fly a scenic route from Zurich, Switzerland, to Innsbruck in Austria. This will end in an unusual and challenging ILS approach from above the mountains down to the airport.

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TrackIR GX



All you need, including a USB cable



The camera also attaches to laptops

High-tech vision the old-fashioned way

You may not make it this time.

The enemy is on your tail like glue. As you pull into a tight turn you hit the button for a notch of flaps and then roll quickly upside down, reaching your thumb up to scroll the view.

Too late... you've lost sight of the bandit. The next thing you know, your plane is falling to pieces and you're bailing out...

Who needs this kind of aggravation when it comes to virtual flying? Real pilots have more than one advantage over the virtual pilot – they can not only feel the g-forces or the shudder in the airframe as stall speed approaches, but can simply pivot their head to change the view. In the virtual world, view management is much more complex and much slower. The padlock view was designed partly to alleviate this problem, but the padlock view in most simulations is far from perfect. What if you could simply turn your head to change your field of view, just like a real pilot? NaturalPoint to the rescue!

NaturalPoint's TrackIR GX is an attempt to make life easier for the virtual pilot by returning view control to the pilot's head. The user sticks a small reflective dot on their forehead, or on the frame of their glasses, and an infra-red beam is projected and tracked by a small camera. TrackIR follows the motion of the dot and instructs the

computer to move accordingly. The unit connects to the PC via a USB port, and the camera sits on top of your monitor. Simplicity itself!

It works just as advertised, and the software is highly configurable. Originally developed for the physically challenged, the software can be set with a sticky cursor for dialogue boxes and can even be configured to generate a mouse click after a given time of rest ('dwelling' on an icon or button). This is particularly convenient; imagine sitting in front of your laptop and paging through a document without touching a key or a mouse. You can also move between programs, or open and close them, using the same method. Your flight sims, however, can put TrackIR to much better use.

The latest software is a 2Mb download which didn't throw up any installation problems, and the USB extension cable required is provided. No separate power source is

required, and there are no goggles to wear or wires to trail from complicated headgear. Configuration can be as quick as loading a preset profile, or as complex as you want to make it. A quick test with default settings in FS2002 and in IL-2 showed that some adjustments would be necessary.

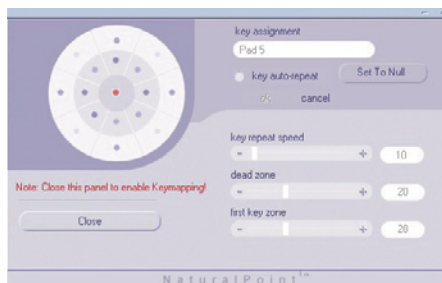
On our test system (1.5GHz AMD Athlon, 512Mb RAM, GeForce3 graphics card) panning was too slow and the cursor tended to wander from the centre when TrackIR was activated. To remedy this we set up a MOVE control (making TrackIR inactive until a key is pressed) and another button for return to centre. We also scaled the tracking response to 2x settings, and increased smoothing control to 80%. A new FS2002 driver has just been released, however, and users report impeccable performance.

The cursor control works very nicely, particularly in the virtual cockpit mode of FS2002. The ability to simply scan from the panel to the windows, then back to the panel, gave us a new sense of immersion. Naturally, the unit works equally well in an external view. We could pan around the aircraft, up and down, simply by a slight motion of the head. You can actually rock slightly in your chair to provide the same effect without having to move your head.

By now you might be thinking, "If I turn my head to the left, I'll lose sight of my monitor.... how does this work?" What TrackIR does is scale the user response, so



Configuration is simple and flexible



Keymapping – control functions as well as views

that a movement of perhaps 10 degrees of arc translates into 45 degrees of movement on the screen. The software allows adjustment of this scaling, so that you could have 10 degrees of head movement translate into 90 degrees of arc in the virtual world. As you turn your head, you have to track the screen by moving your eyes slightly; it feels quite natural after you get used to it, and provides the eerie sensation of having entered a virtual world.

You're sitting on the runway in FS2002, and have checked in with ATC and received clearance. Instead of reaching for a POV switch on the joystick, just move your head slightly to the left and look out of the window; move it to the right and you're looking across the co-pilot's position out of the right window. Similarly, glancing out of the window to track the runway on finals is as

natural as turning your head. The real beauty of this device is that you quickly forget that there is any special hardware involved.

A new option with the latest software is Keymapping, which lets you send keystrokes to your sim based on 17 possible head positions. We mapped a configuration for IL-2 to test the zone tracking, and it was then that we rediscovered the utility of the padlock view system. Many virtual pilots will be very comfortable with panning views and snap views, as well as external views and padlock views, but not as many are comfortable with internal views. TrackIR really shines when used in conjunction with padlock view and restricted view systems.

Where view response is critical, as in combat situations, TrackIR makes a strong showing. In practice it works like this: you're



No wires, no headset, no fuss



Once you get used to it, you'll wonder how you managed before

in an internal cockpit view looking forward. TrackIR is in the button-activated mode, so you press the [F11] key, which is programmed to a button on your joystick. Now you begin your standard scan of the area. First, you move your head up slightly, and the view pans upwards. Then you scan down and to the left, then as far back as the sim allows (about 270 degrees). Then you scan across the panel and to the right side, panning to the back.

If you notice an enemy, you hit the padlock key on your joystick; a red triangle appears around the aircraft, and TrackIR gives control of the cursor to the simulation. Your view will stay locked on the bandit as long as he remains within normal human viewing constraints and doesn't stray into cloud. If you hit the wide FOV key and roll your aircraft until the bandit is positioned overhead, you can pull back on your stick until he is in your forward view. You can now manoeuvre relative to the bandit or switch to an external tracking view, if you have that option selected. If your opponent passes outside your field of view, simply hit the TrackIR key again, locate him and hit the padlock key.

NaturalPoint should be applauded for bringing some very high-tech visual equipment to our desktops for a reasonable amount of money. TrackIR is unobtrusive, simple to use and, above all, it works perfectly – a noteworthy step towards greater visual realism. ■

Leonard Hjalmarson

Review Score

Manufacturer: NaturalPoint

Price: £129.95 from RC Simulations (www.rcsimulations.com)

Website: www.headtracking.com

Developer: Eye Control Technologies

At a glance: Simple to install, easy to configure, and excellent performance. A natural addition for the virtual pilot.

System Requirements: Windows 98SE/2000/ME/XP, 24Mb RAM, Pentium 166, 5Mb disk space, USB port

Recommended: As long as you have a free USB port, you'll be fine with anything exceeding the above requirements.

Saitek X45 Flight Controller

Saitek's cool and classy combo



Throttle and stick both ooze class

Whether your preference is for a joystick or yoke, there is certainly no shortage of options when shopping for a new flight controller. CH Products, Logitech, Microsoft, Saitek, Thrustmaster – there are plenty of big names around, all assuring the buyer that one product exists which is exactly suited to the job. This month Saitek dropped off their X45 Flight Controller, a combination throttle and joystick that adds sex appeal to an otherwise bland desktop environment. Great looks are always pleasing, but ergonomics, performance, and button placement are paramount for any serious flight freak, and it's these categories which we'll be scrutinizing here.

The package

Superficially, everything about the Saitek X45 is h-o-t. The retail packaging looks terrific, the contents are packed with the utmost care and protection, and our first glance at the hardware suggested excellence on all fronts. Other than the actual USB control stick and USB throttle, there's an 11-page manual in a variety of European languages and the driver/software CD is included in the package. The main features of the hardware are as follows:

Control stick

- 4 fire buttons (including missile launcher with safety cover)
- Trigger
- 2 8-way hat switches
- 'Pinkie' shift function with LED
- Industrial grade micro-switches

Throttle/rudder system

- 2 fire buttons
- 4-way hat switch
- Detents for throttle control
- Rudder control
- 2 rotary controls
- Mouse controller or 4/8-way hat switch
- 3-position mode selector with status LEDs

Installation

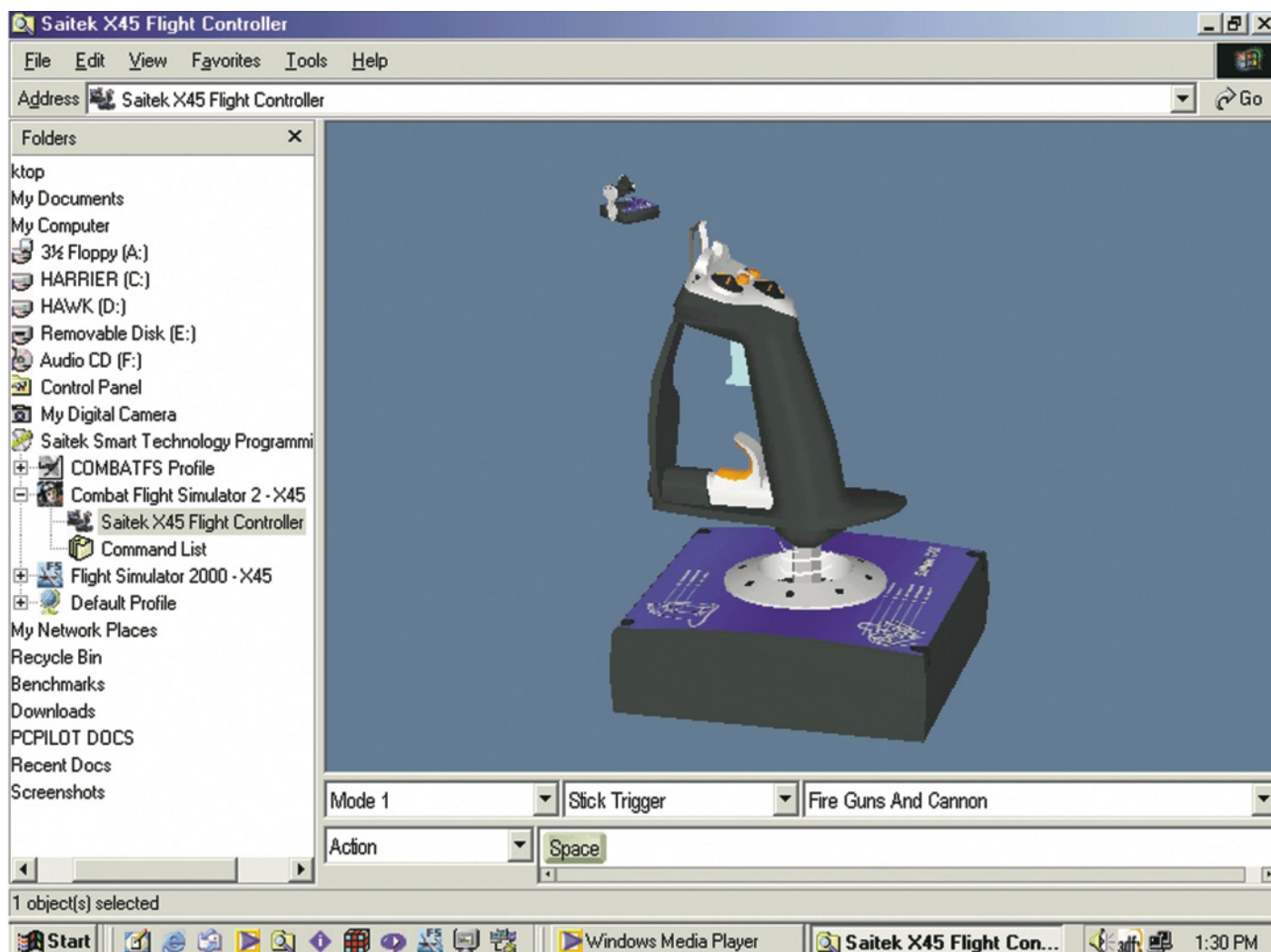
USB devices are normally a walk in the park to install, and the X45 is no exception. If you are using Windows XP or 2000, however, an Internet download is necessary to get functioning drivers. (The CD contains

drivers for Windows 98 and ME). After the software is loaded, simply connect the throttle to the control stick (cable provided), plug in the USB cable, and Windows will detect the controller. Windows ME was flawless, while Windows 2000 gave us several error messages after stating the drivers had been installed successfully. Nevertheless, the X45 appeared as expected in the control panel, and was ready for duty.

Also included on the CD is Saitek's 'Smart Technology Programming Software', their proprietary software which can configure the X45 into a particular profile, preset for certain applications.

Configuration, ergonomics, performance

Plenty of desktop space is required for the X45, the two parts of which sit nicely either side of a keyboard and mouse. A useful touch is that Saitek has illustrated the bases of the stick and throttle with button layout maps, which easily identify every switch and knob. Additionally, many of the buttons themselves have labels and/or LEDs.



There are plenty of configuration possibilities, even if you don't use the presets!

The Smart Technology Programming Software was designed to take advantage of the triple mode capabilities of the X45. An intuitive yet complex process allows button and switch assignments for essentially any game executable on your hard drive. Unfortunately, after many attempts to set up our controls for FS2002, it never actually worked within the sim. Countless times we tried setting up CFS, CFS2, and FS2000, all of which left us in the same dilemma – on launching the respective simulations, our original button assignments were always loaded. This isn't a huge issue, however, with 5 axis controls, 7 buttons and 4 hat switches offering plenty of configuration possibilities.

Overall, the stick and throttle are solidly built, and remain comfortable even after an hour or two of flying. Both have moulded rest areas for the underside of the palm while a soft layer of material provides a luxurious feel. The switches and buttons are tight, the dials smooth and precise. The 'Pinkie' switch is a bit questionable, as occasionally we would accidentally trigger it during combat or hard turns. The missile launch button's safety cover is a weak link in an otherwise finely crafted product; its sloppy attachment causes it to drop down over the button during flight. The stick's centring springs seemed a bit tight relative to the weight of

the stick, causing the 7x7-inch base to lift off the desk slightly during steep turns.

Rudder control is by a rocker switch at the lower front side of the throttle, which might take a little time to adjust to. It's rather awkward at first, if you are used to pedals or a twisting joystick. Speaking of pedals, the popular CH USB Pro Pedals made an ideal complement to the X45 within CFS2 and FS2002. Throttle ergonomics are excellent, but the detent and friction adjustments are truly what sets this apart from the average throttle handle. With precise, steady inputs

and a smooth arced movement, the X45's throttle is first rate.

Final analysis

Judging by appearances, we expected the retail price to be considerably higher, but at £99.99, this might well be the best throttle/stick controller available. Units are currently available from UK websites and retailers for a lot less than that, which really does make the X45 worth seeking out. With a high-tech, complex, yet pleasing presence, there are few controllers that can compare. A few improvements are needed, but overall performance and programmability are excellent. While we couldn't get on with the Smart Technology (not smart enough!) programming, we don't doubt its functionality if working properly.

Greg Gott

Pros

- USB connection for fast/easy installation
- Solid construction
- Highly programmable
- Smooth, accurate performance
- Looks great
- Excellent value

Cons

- Unable to utilize STPS profiles
- Stick centring spring excessively strong
- Rudder control is initially awkward

Review Score



Manufacturer: Saitek

Price: £99.99

Website: www.saitek.co.uk

At a glance: Well-built and attractive units, and the performance is excellent. Highly configurable, and reasonably priced.

GeForce 4

The New Generation

Graphics cards – time to shuffle the pack?

Two years ago nVidia introduced their GeForce line of video accelerators, featuring integrated T&L (Transformation and Lighting). For the first time in a mainstream video product, the video card was doing virtually all the work of building the final 3D scene for display; the world of flight simulation has not been the same since. This first generation soon gave way to the GeForce2 GTS, with its 32 or 64Mb of main memory. At 200MHz, and with nearly 6Gb of memory bandwidth, the GeForce2 series topped out at around 6,000 3dMarks on a 1GHz system. 3dMark 2001 is a synthetic test suite that includes frame rate measured in actual in-game demos as well as raw throughput – a good all-round indication of performance.

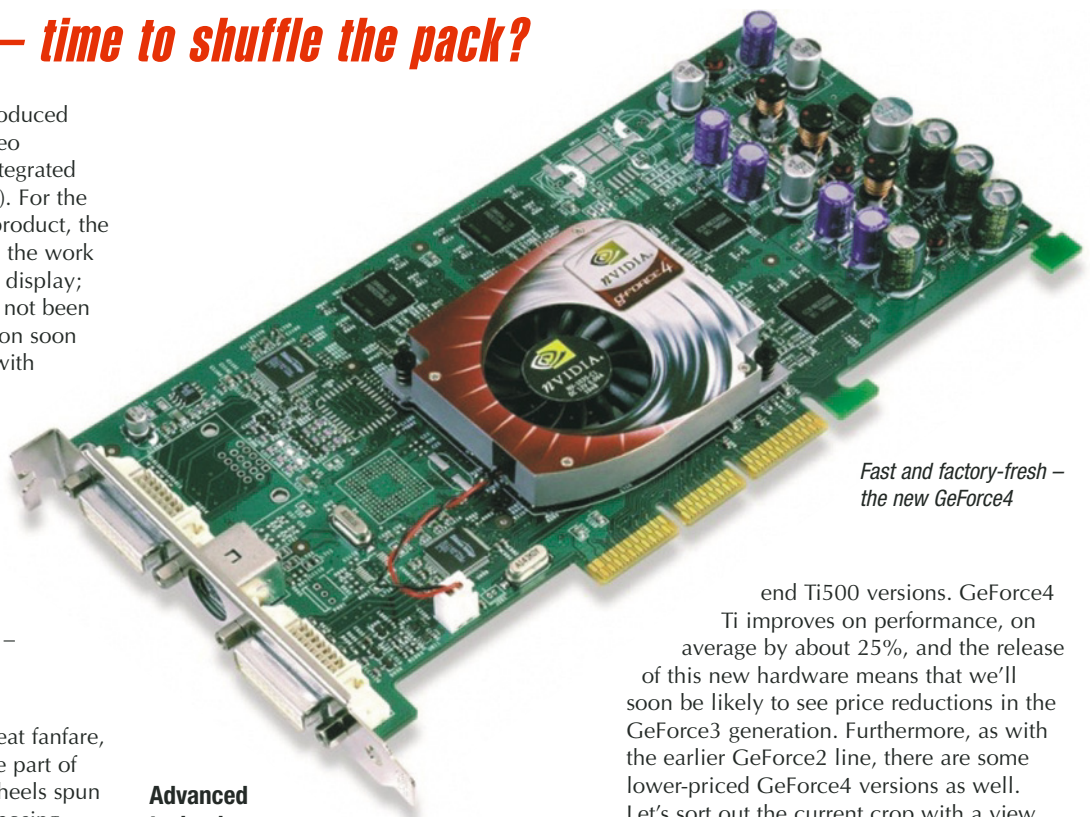
GeForce3 arrived in 2001 to a great fanfare, but also to some confusion on the part of virtual pilots. As the marketing wheels spun into motion, desktop flyers were posing some tough questions: "What use are all these programmable features when my current simulators, and even ones in late stages of development, won't be able to take advantage of them? Why should I pay a price premium for the latest technology instead of simply buying the last generation of hardware?"

The answer is, of course, future-proofing – buying with an eye to the future; but with GeForce4 only refining existing features rather than adding any new ones, the question becomes even more pointed. As a result, the purchasing decisions are more complex than ever. The new arrival from nVidia suggests that this is probably as good a time as any to survey the current scene, and take a look at the price/performance equations concerning their graphics cards.

Advanced technology equals complex decisions

The advanced technology behind the introduction of the GeForce3 range required a new video vocabulary. Amongst the new terminology we were introduced to were Lightspeed Memory Architecture, Vertex Processing Algorithms, the nFiniteFX engine and plenty more jargon besides. The technology behind video revolutions is inevitably complex, but what difference does it actually make when you're on finals over London in a 737?

While GeForce3 was indeed revolutionary, it's only now that we are seeing the software catch up with the hardware. GeForce3 became GeForce3 Ti (Ti standing for Titanium) in the low end Ti200 and high



Fast and factory-fresh – the new GeForce4

end Ti500 versions. GeForce4 Ti improves on performance, on average by about 25%, and the release of this new hardware means that we'll soon be likely to see price reductions in the GeForce3 generation. Furthermore, as with the earlier GeForce2 line, there are some lower-priced GeForce4 versions as well. Let's sort out the current crop with a view to a kill.

Last month nVidia launched the GeForce4 line of accelerators; available in at least four variants, the GeForce4 will appear in the flagship Ti4600 with 128Mb of main memory, the middle-of-the-range Ti4400 with 128Mb, and the MX variant with 64Mb.



GeForce4 MX – at the budget end of the range



The clock speed for the flagship Ti4600 product is now 300 MHz, a fair increase from the 240 of the previous GeForce3 Ti500. Memory speed has increased to 325MHz from 240, while memory bandwidth is up more than 25%. The flagship product also doubles the amount of raw memory in GeForce3 to 128Mb. The physical changes are in memory technology, anti-aliasing, and the addition of a second vertex shader unit. The use of two of these units will improve performance in simulators that use more complex lighting and alpha effects such as smoke, clouds and transparency.

Anti-aliasing has never quite lived up to its promise where nVidia is concerned, and the performance penalty started at 25-30%. The new Accuvision engine in GeForce4 is both more accurate and much faster, so those for whom budget is not a restriction can gladly reach deep into their pockets and enjoy the best that nVidia can now offer in the shape of the GeForce4 Ti4600.

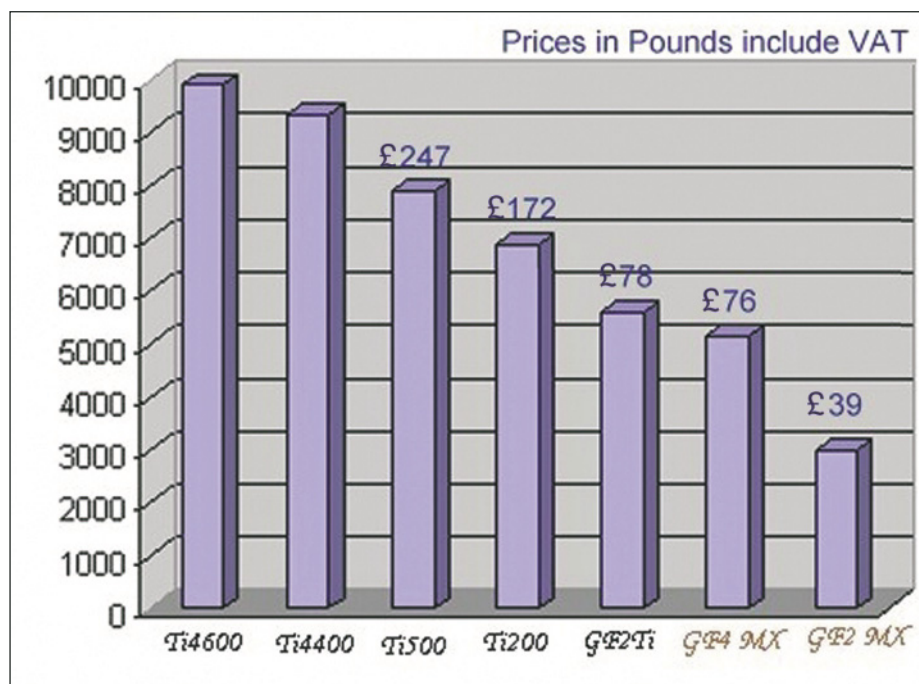
At the other end of the scale, GeForce4 MX sports the same core, but minus the programmable pixel shaders. The GeForce4 MX is therefore a neutered chip, but still a very powerful one in current 3D applications. Its performance is nearly double that of the GeForce2 MX, and roughly equivalent to the GeForce2 Pro. It lacks, however, full DirectX 8 compliance for future software.

Presenting the challengers

The current nVidia products are marketed under a diverse range of labels – the ELSA Gladiac 925, the VisionTek Xtasy GeForce4 Ti4600 and so on – but all these various boards are equipped with one of seven accelerator chips; It's rather like buying a new VW or a new Skoda, where you're buying a different car with essentially the same engine. Unless the Ti4600 is in the actual name, it can be tough to tell what you are getting, so make sure you know exactly what's inside the box! The nVidia engines currently available include seven major variants, all of which are plotted on the chart.

It's worth noting that their actual performance in your chosen sim can vary more than synthetic testing indicates, and will also scale differently on lower-speed CPUs than on high-end ones. The chart serves only as a general guideline to

3dMark 2001



Price versus performance

performance, but it throws up some interesting results. The prices shown are the best available on www.pricewatch.co.uk in February of this year.

At the low end of the scale, if you don't yet run a GeForce3 or GeForce2 board the GeForce2 MX is really not worth considering for most simmers, except perhaps to keep you up and running until you can afford a major upgrade. The competition for your cash becomes the most interesting at two points: firstly in the old GeForce2 generation, and secondly between the high-end GeForce3 Ti and the new GeForce4 Ti4400.

From the price versus performance point of view, why would anyone buy the GeForce2 Ti any longer? It would make more sense to purchase the new GeForce4 MX, and the GeForce2 boards are now being discontinued. The GeForce4 MX has more memory and a wider memory pathway, though the benefits won't be apparent in current games.

But what about the PC pilot who is buying for the future and who has deeper pockets? Actual performance of the GeForce4 Ti4400 is on average 20-30% higher than the GeForce3 Ti200 in current sims, but this margin of difference is reduced between the Ti4400 and the Ti500.

Current prices place the GeForce3 Ti500 and GeForce4 Ti4400 at nearly the same point. If the price difference remains small when you come to buy, we highly recommend that you choose the GeForce4 Ti4400. But if you can purchase the GeForce3 Ti500 at a greatly reduced price, you shouldn't hesitate to do so. In both cases you retain compliance with

the latest features of DirectX 8. Remember – this is NOT the case with the GeForce4 MX.

All things considered, GeForce4 is a solid evolutionary product. Those of you who are early adapters will benefit by nVidia's frequent driver updates and the fairly mature level of current driver production. Since nVidia was ready, technically speaking, to ship GeForce4 parts last November, they have had plenty of time to develop reliable drivers.

Leonard Hjalmarson

An upgrade quandary

Should you really be upgrading your graphics card, or would you get better performance by upgrading your CPU?

If your CPU runs at less than 1GHz, and if you already run a GeForce2 card, consider the processor upgrade first. If you have a 1GHz CPU or better, and are running a GeForce2 product other than the Ultra, it's worth moving up to GeForce4. But DO NOT substitute the GeForce4 MX for any GeForce2 card other than the GeForce2 MX.

If your system is already equipped with GeForce3, and has a 1GHz CPU or less, consider upgrading your CPU. If you are currently running GeForce3 with a 1.2 GHz CPU or faster, you should only upgrade if you have money to burn. Should you have 256Mb or less of memory, it's time to invest in some more. Remember that if you are moving up from a 1GHz CPU or less, you are also going to require a new motherboard and some new memory.

Downloads

Star performers from the Internet

It seems that once again FS2002 files dominate the major FS download sites. Although we do try to cover all areas of flight simulation, we can only select from those files that have been uploaded. So, as we mentioned in the last issue, if you've downloaded files that you would like to share with the rest of us, drop us an e-mail with your recommendations.

(Please note that, where possible, we are now asking authors for permission to include the download recommendations on our cover CD. This makes it much easier to access the files, but if permission is denied it won't affect our decision to recommend their work).

Joe Lavery



Piper Cherokee Arrow III Prop Aircraft



Flight Simulator 2002

Author: Warren Baier
Repaint by: Mario Coelho

Download from: Cover CD
Filename: ACMpiper.zip

Around again for another touch-and-go



Excellent external detail



Notice the filler caps, air intakes and pilot's step



Check the oil before we go



Make sure that baggage is stowed safely



You have control... No, you have control!



Looks a tad high to me!

Our Star Download for this issue is a repaint from Mario Coelho of an original aircraft design by Warren Baier – one of the most popular GA aircraft of recent years, the Piper Cherokee Arrow III. This is an aircraft I'm well acquainted with, after once belonging to a group who flew the Cherokee and having spent a great deal of time training on the Piper Warrior, a derivative of the Cherokee.

The aircraft was created using gMax, the excellent 3D design package included with FS2002. (Incidentally, if you own FS2002 and you haven't had a look at this yet, you're missing out on one of the most comprehensive design tools on the planet, and it's free if you have the Professional edition. (We'll be taking a look at gMax in the next issue of PC Pilot).

This repaint from Mario is done in the colours of the Aero Clube Mozambique-Reg 543, complete with photorealistic panel using mainly default gauges. What made us decide to nominate this aircraft as our Star Download was the sheer quality and number of special features that are not normally found even on commercial products. The engine cowl, for example, opens to expose a detailed engine, and the baggage compartment and passengers door (which is in fact the only door on the Cherokee) can also be opened. The paintwork and external detail are superb, showing practically every rivet and ripple in the aircraft's skin.

In addition, the pilot's head turns with the nose wheel and both the pilot and passenger bounce up and down when the aircraft is taxiing on an uneven surface. These are undoubtedly gimmicks, but they certainly underline the amount of work that the author has put into this project.

When it comes to more important matters like the flight model, then there is only one way to reach an evaluation and that's to take to the air. The author admits to using the default Mooney .air file for the Cherokee, which he modified (to good effect) to reflect the Cherokee's dimensions, moments of inertia and control surface areas. This has produced a stable and realistic aircraft that is slightly more powerful than I remember but has the same tendency to float as the real one, sometimes making it difficult to land cleanly. The stall speed, both clean and with flaps, is about right, so you get a good overall impression of the real aircraft.

We have included both the repaint and the original files from Warren Baier, which now include an update.

Please note that while this aircraft is designed for FS2002 Pro, the author states that it should work with the standard version as well.

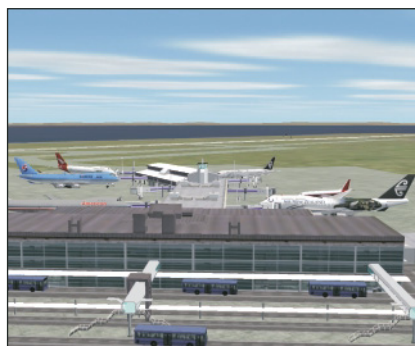
The rest of the best



**Bombardier
Canadair CL415
Prop Aircraft**

Flight Simulator 2002

Authors: Massimo Taccoli,
Rolf Hockmuth, Andrea
Cini, Eric Turpin
Download from: Cover CD
Filename: 415pc02f.zip



**Auckland Intl.
Airport
Scenery**

Flight Simulator 2002

Author: Shayne Butler
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**B737-200
Lufthansa Express
Jet Aircraft**

Flight Simulator 2002

Author: Terry Gaff
Repaint by:
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**Philippine Airlines
A320-200
Jet Aircraft**

Flight Simulator 98

Author: R. Bobby Santos
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**Mannheim City
Scenery**

Flight Simulator 2002

Authors: Viktor Schacht and
Martin Wiczorek
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**Sikorsky S-38C
Amphibian
Prop Aircraft**

Flight Simulator 2002

Author: George Diemer
Panel by: Eliezer Rice
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**Junkers Ju-52
Floatplane
Prop Aircraft**

Flight Simulator 2002

Author: Pierino Primavesi
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**Vickers
Viscount 745D
Prop Aircraft**

X-Plane

Author: Dennis Foulk
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**Dassault
Mirage IIIEA
Jet Aircraft**

Flight Simulator 2002

Author: Jason Ashworth
Repaint by:
Osvaldo Martinetti
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**P-38 Lightning
(Variant)
Prop Aircraft**

Flight Simulator 2002

Author: David C. Copley
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At The Controls

Aviation as art

This truly beautiful book is a revelation. Very rarely do any of us get the chance to see these aircraft in the flesh, let alone linger for hours in the cockpit, simply admiring the technology and craftsmanship on display. With this collection you can bask for as long as you please in the cockpits of machines, both civil and military, ranging all the way from the Wright Brothers' 1903 Flyer to the Columbia space shuttle, and over forty additional planes receive similarly stunning treatment.

The photographs themselves are breathtaking, and show off perfectly every last detail of the cockpits, whether it's the minimal controls of the Bellanca C.F. or the comparatively spacious interior of the Airbus 320. Each cockpit image is given its own full 11" x 9" page, and there are several close-ups of interesting features – an ejection seat mechanism and a reflector unsight are transformed into works of art.

The focus of the accompanying text is naturally on the cockpits, without once

resorting to lists of dry technical specifications, and the historical background to all the featured planes is as fascinating as the visual aspect of the book. Images of the planes to which the cockpits belong have also been included and let you put the cockpit photographs into context.

As you might expect, given the book's origins in Washington's National Air and Space Museum, the choice of aircraft spans the history of aviation. Familiar names such as Mustang, DC-7 and Sabre sit alongside more eclectic machines such as the Boeing P-26A Peashooter and the jet-powered Kugisho Ohka, specially designed for kamikaze missions.

Whichever page you turn to, expect to be delighted; the photography in *At The Controls* really is that exceptional.

Joe M. Besser



Review Score: ★★★★★

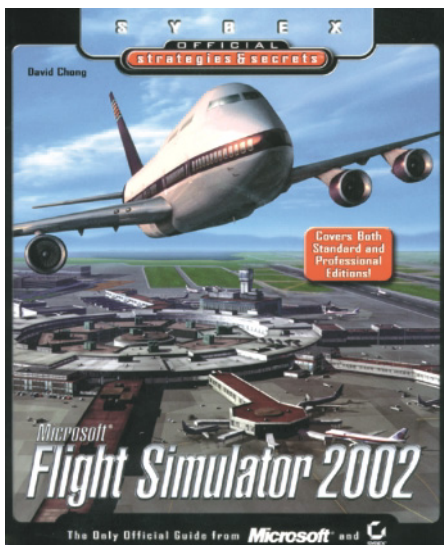
Publisher: Airlife Books

Price: £25.00

Website: www.airlifebooks.com

Authors/Photographers: Tom Alison & Dana Bell / Eric F. Long & Mark A. Avino

At a glance: The last word in cockpit photography, with an informative commentary. A feast for the eyes.



Anyone casting an eye over general games/PC magazines recently will have noticed that the 2002 version of Flight Simulator warranted an unusual amount of press for a flight simulator. Good news, undoubtedly, but it's a fair bet that many of those impressed by what they saw will have been taken aback by the complexity of Microsoft's latest offering, and PC flying in general, once they loaded it into their PCs. It would appear to be at these relative newcomers that the Microsoft-endorsed *Official Strategies* is aimed.

The title is actually a little misleading; the word 'secrets' tends to conjure up visions of

Microsoft FS2002 Sybex Official Strategies & Secrets

Secrets or second-hand information?

arcane knowledge and information that won't be found in all the obvious places. Sadly this isn't the case, but this is a useful read for beginners and for those who might not yet consider themselves veterans of the virtual skies. Much of the information here is contained in the excellent onscreen manual and Help files, but there are still many who prefer opening a book to constantly changing screens on their monitor.

The early sections on configuration and getting started contain some useful information, as do the pages on navigation, emergencies, and airspace. The chapters devoted to the flight activities included in FS2002 are informative, while not essential, and there's an introduction to the world of online flying. The chapter devoted to the FS2002 aircraft and checklists, on the other hand, won't be the most scintillating read you'll have this year.

If FS2002 isn't your first version of Flight Simulator, you'd probably be better off with

The Good Flight Simmer's Guide, with its excellent reference sections, but if you're a recent convert to the joys of desktop flying, then you'll find plenty of helpful information in *Official Strategies*. In an ideal world, the best parts of this book would have been integrated with the onscreen manual and Help files, and it would be included in the box with the program. In short, the sort of manual we'd all love to see, and which FS2002 deserves.

Joe M. Besser

Review Score: ★★★★★

Publisher: Sybex

Price: £14.99

Website: www.sybex.com

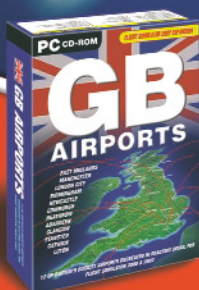
Author: David Chong

At a glance: Useful information for the FS newcomer, but too insubstantial for those with a full virtual licence.

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